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Note: Addenda information is NOT included with the electronic documents available via electronic file transfer. Only bidder or non-bidder package holders listed with the Caltrans Plans and Bid Documents section as described above will receive addenda information.



**STATE OF CALIFORNIA**  
**DEPARTMENT OF TRANSPORTATION**

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**NOTICE TO CONTRACTORS**  
**AND**  
**SPECIAL PROVISIONS**  
**FOR CONSTRUCTION ON STATE HIGHWAY IN**  
**PLACER COUNTY FROM MAGRA OVERHEAD TO PUTTS LAKE UNDERCROSSING**

**DISTRICT 03, ROUTE 80**

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**For Use in Connection with Standard Specifications Dated JULY 1995, Standard Plans Dated JULY 1997, and Labor  
Surcharge and Equipment Rental Rates.**

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**CONTRACT NO. 03-1A80U4**  
**03-Pla-80-62.7/88.2**

**Federal Aid Project**  
**ACIM-ACIMG-080-4(168)145E**

**Bids Open: June 28, 2000**  
**Dated: May 15, 2000**

**OSD**

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# IMPORTANT SPECIAL NOTICES

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- The bidder's attention is directed to Section 5, containing specifications for "Disputes Review Board," of the Special Provisions, regarding establishing a Disputes Review Board (DRB) for the project.
- Attention is directed to the Notice to Contractor and Section 1, \"Plans and Specifications,\" of the special provisions regarding references to the District and District Director's Office. The Office of the District Director for the Northern Region is located at Marysville.
- The Special Provisions for Federal-aid projects (with and without DBE goals) have been revised to incorporate changes made by new regulations governing the DBE Program (49 CFR Part 26).

Sections 2 and 5 incorporate the changes. Bidders should read these sections to become familiar with them. Attention is directed to the following significant changes:

Section 2, "Disadvantaged Business Enterprise (DBE)" revises the counting of participation by DBE primes, and the counting of trucking performed by DBE firms. The section also revises the information that must be submitted to the Department in order to receive credit for trucking.

Section 2, "Submission of DBE Information" revises the information required to be submitted to the Department to receive credit toward the DBE goal. It also revises the criteria to demonstrate good faith efforts.

Section 5, "Subcontractor and DBE Records" revises the information required to be reported at the end of the project, and information related to trucking that must be submitted throughout the project.

Section 5, "DBE Certification Status" adds new reporting requirements related to DBE certification.

Section 5, "Subcontracting" describes the efforts that must be made in the event a DBE subcontractor is terminated or fails to complete its work for any reason.

Section 5, "Prompt Progress Payment to Subcontractors" requires prompt payment to all subcontractors.

Section 5, "Prompt Payment of Withheld Funds to Subcontractors" requires the prompt payment of retention to all subcontractors.

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## SPECIAL NOTICE

Caltrans is conducting a pilot program in cooperation with Surety 2000, to test electronic bond verification systems. The purpose of the pilot program is to test the use of Surety 2000 for verifying a bidder's bond electronically.

Surety 2000 is an Internet-based surety verification and security system, developed by the surety industry. Surety agents may contact Surety 2000 at 1-800-660-3263.

Bidders are encouraged to participate in the pilot program. To participate, the bidder is asked to provide the "Authorization Code" provided by Surety 2000, on a separate sheet, together with the standard bidder's bond required by the specifications. The bidder's surety agent may obtain the "Authorization Code" from Surety 2000.

The Department will use the "Authorization Code" to access the Surety 2000 database, and independently verify the actual bidder's bond and document the functioning of the Surety 2000 system.

"Authorization Codes" will be used only to verify bidder's bonds, and only as part of the pilot program. The use of "Authorization Codes" will not be accepted in lieu of the bidder's bond or other bidder's security required in the specifications during the pilot study.

The function of the Surety 2000 system is to provide an easier way for Contractors to protect their bid security, and to discourage fraud. This system is available to all California admitted sureties and surety agents.

The results of the pilot study will be tabulated, and at some time in the future, the Department may consider accepting electronic bidder's bond verification in lieu of the bidder's bond specified.

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# TABLE OF CONTENTS

NOTICE TO CONTRACTORS.....	1
COPY OF ENGINEER'S ESTIMATE .....	3
SPECIAL PROVISIONS .....	11
SECTION 1. SPECIFICATIONS AND PLANS.....	11
SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS.....	11
2-1.01 GENERAL.....	11
2-1.015 FEDERAL LOBBYING RESTRICTIONS.....	11
2-1.02 DISADVANTAGED BUSINESS ENTERPRISE (DBE).....	12
2-1.02A DBE GOAL FOR THIS PROJECT.....	13
2-1.02B SUBMISSION OF DBE INFORMATION .....	14
SECTION 3. AWARD AND EXECUTION OF CONTRACT.....	15
SECTION 4. BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES .....	15
SECTION 5. GENERAL .....	15
SECTION 5-1. MISCELLANEOUS .....	15
5-1.00 PLANS AND WORKING DRAWINGS .....	15
5-1.003 LABORATORY .....	15
5-1.005 CONTRACT BONDS .....	16
5-1.01 LABOR NONDISCRIMINATION.....	16
5-1.02 LABOR CODE REQUIREMENTS .....	16
5-1.023 INDEMNIFICATION AND INSURANCE.....	19
5-1.025 ARBITRATION .....	21
5-1.03 PAYMENT OF WITHHELD FUNDS.....	21
5-1.04 INTEREST ON PAYMENTS .....	22
5-1.05 PUBLIC SAFETY .....	22
5-1.06 SURFACE MINING AND RECLAMATION ACT.....	23
5-1.07 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES.....	23
5-1.08 YEAR 2000 COMPLIANCE.....	24
5-1.085 BUY AMERICA REQUIREMENTS.....	24
5-1.09 SUBCONTRACTOR AND DBE RECORDS .....	24
5-1.093 DBE CERTIFICATION STATUS .....	25
5-1.095 PERFORMANCE OF DBE SUBCONTRACTORS AND SUPPLIERS .....	25
5-1.097 SUBCONTRACTING.....	25
5-1.098 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS .....	26
5-1.099 PROMPT PAYMENT OF WITHHELD FUNDS TO SUBCONTRACTORS .....	26
5-1.10 PARTNERING .....	26
5-1.11 FORCE ACCOUNT PAYMENT.....	26
5-1.12 DISPUTES REVIEW BOARD .....	27
5-1.13 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS.....	37
5-1.14 AREAS FOR CONTRACTOR'S USE.....	38
5-1.15 PAYMENTS .....	38
5-1.16 WATER CONSERVATION.....	38
5-1.17 RELATIONS WITH CALIFORNIA DEPARTMENT OF FISH AND GAME .....	38
5-1.18 RELATIONS WITH CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD .....	39
5-1.19 RELATIONS WITH UNITED STATES ARMY CORPS OF ENGINEERS .....	39
5-1.20 RELATIONS WITH PLACER COUNTY.....	39
5-1.21 ENVIRONMENTALLY SENSITIVE AREAS .....	40
SECTION 6. (BLANK).....	40
SECTION 7. (BLANK).....	40
SECTION 8. MATERIALS .....	40
SECTION 8-1. MISCELLANEOUS .....	40
8-1.01 SUBSTITUTION OF NON-METRIC MATERIALS AND PRODUCTS .....	40
8-1.02 APPROVED TRAFFIC PRODUCTS .....	45
8-1.03 STATE-FURNISHED MATERIALS .....	50
8-1.04 ASPHALT .....	51

8-1.05 MEASUREMENT OF QUANTITIES .....	53
8-1.06 ENGINEERING FABRICS .....	53
SECTION 8-2. CONCRETE .....	53
8-2.01 PORTLAND CEMENT CONCRETE .....	53
8-2.02 FREEZE-THAW REQUIREMENTS .....	63
8-2.03 CEMENT AND WATER CONTENT .....	63
SECTION 8-3. WELDING .....	63
8-3.01 WELDING ELECTRODES .....	63
8-3.02 WELDING QUALITY CONTROL .....	64
SECTION 9. DESCRIPTION OF BRIDGE WORK .....	68
SECTION 10. CONSTRUCTION DETAILS .....	68
SECTION 10-1. GENERAL .....	68
10-1.00 CONSTRUCTION PROJECT INFORMATION SIGNS .....	68
10-1.01 ORDER OF WORK .....	68
10-1.02 WATER POLLUTION CONTROL .....	70
10-1.03 TEMPORARY FENCE (ENVIRONMENTALLY SENSITIVE AREAS) .....	74
10-1.04 COOPERATION .....	74
10-1.05 PROGRESS SCHEDULE (CRITICAL PATH) .....	75
10-1.06 OVERHEAD .....	81
10-1.07 OBSTRUCTIONS .....	83
10-1.08 MOBILIZATION .....	84
10-1.09 CONSTRUCTION AREA SIGNS .....	84
10-1.10 MAINTAINING TRAFFIC .....	85
10-1.11 CLOSURE REQUIREMENTS AND CONDITIONS .....	87
10-1.12 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE .....	88
10-1.13 TEMPORARY PAVEMENT DELINEATION .....	90
10-1.14 TRAFFIC PLASTIC DRUMS .....	92
10-1.15 TRAFFIC CONTROL SURVEILLANCE .....	93
10-1.16 PORTABLE CHANGEABLE MESSAGE SIGN .....	93
10-1.17 PORTABLE RADAR TRAILER .....	94
10-1.18 TEMPORARY RAILING .....	94
10-1.19 TEMPORARY CRASH CUSHION MODULE .....	95
10-1.20 EXISTING HIGHWAY FACILITIES .....	96
10-1.20A REMOVE UNSOUND CONCRETE .....	96
10-1.20B OBLITERATE SURFACING .....	96
10-1.20C REMOVE DELINEATORS, OBJECT MARKERS AND MILEPOST MARKERS .....	96
10-1.20D REMOVE METAL BEAM GUARD RAILING .....	97
10-1.20E REMOVE DOUBLE METAL BEAM BARRIER .....	97
10-1.20F REMOVE DRAINAGE FACILITIES .....	97
10-1.20G REMOVE TRAFFIC STRIPES .....	97
10-1.20H REMOVE ROADSIDE SIGNS .....	97
10-1.20I REMOVE ASPHALT CONCRETE DIKE .....	97
10-1.20J REMOVE ASPHALT CONCRETE OVERSIDE DRAIN .....	98
10-1.20K REMOVE CONCRETE DECK SURFACE .....	98
10-1.20L RECONSTRUCT CHAIN LINK FENCE .....	98
10-1.20M RECONSTRUCT MODIFIED METAL BEAM GUARD RAILING (TYPE A) .....	99
10-1.20N ADJUST INLETS .....	99
10-1.20O MODIFY WRECKER ANCHOR .....	99
10-1.20P PLASTIC PIPE-LINER .....	99
10-1.20Q REMODEL INLET .....	100
10-1.20R RUMBLE STRIPS IN PORTLAND CEMENT CONCRETE PAVEMENT (GROUND-IN) .....	100
10-1.20S COLD PLANE ASPHALT CONCRETE PAVEMENT .....	101
10-1.20T REMOVE CONCRETE .....	101
10-1.20U REMOVE SALT BUNKER .....	101
10-1.20V CAP INLETS .....	101
10-1.20W BRIDGE REMOVAL (PORTION) .....	102
10-1.21 CLEARING AND GRUBBING .....	102
10-1.22 EARTHWORK .....	102
10-1.23 GEOSYNTHETIC REINFORCED EMBANKMENT .....	103

10-1.24	CONTROLLED LOW STRENGTH MATERIAL .....	106
10-1.25	SHOULDER BACKING .....	106
10-1.26	ARRESTOR BED AGGREGATE .....	107
10-1.27	EROSION CONTROL (BLANKET) .....	108
10-1.28	EROSION CONTROL (TYPE D) .....	109
10-1.29	EROSION CONTROL (MULCH) .....	111
10-1.30	FIBER ROLLS .....	112
10-1.31	WILLOW CUTTINGS (PLANT GROUP W) .....	113
10-1.32	AGGREGATE BASE .....	114
10-1.33	SLURRY SEAL .....	114
10-1.34	REPLACE ASPHALT CONCRETE SURFACING .....	114
10-1.35	ASPHALT CONCRETE .....	115
10-1.36	BOND BREAKER .....	118
10-1.37	CONCRETE PAVEMENT (DOWELED) .....	118
10-1.38	INTERMEDIATE PAVEMENT ANCHORS .....	123
10-1.39	REPLACE CONCRETE PAVEMENT .....	123
10-1.40	CRACK EXISTING CONCRETE PAVEMENT .....	126
10-1.41	CONCRETE STRUCTURES .....	127
10-1.42	STRUCTURE APPROACH SLABS (TYPE R) .....	127
10-1.43	PAVING NOTCH EXTENSION .....	130
10-1.44	DRILL AND BOND DOWELS .....	131
10-1.45	POLYESTER CONCRETE OVERLAY .....	132
10-1.46	SEALING JOINTS .....	136
10-1.47	RAPID SETTING CONCRETE PATCHES .....	137
10-1.48	REINFORCED CONCRETE CRIB WALLS .....	138
10-1.49	DOWEL (SMOOTH, EPOXY COATED) .....	139
10-1.50	REINFORCEMENT .....	140
10-1.51	SIGN STRUCTURES .....	147
10-1.52	ROADSIDE SIGNS .....	149
10-1.53	TIMBER STRUCTURES .....	149
10-1.54	REINFORCED CONCRETE PIPE .....	150
10-1.55	CORRUGATED METAL PIPE .....	150
10-1.56	OVERSIDE DRAINS .....	151
10-1.57	OVERSIDE DRAINS .....	151
10-1.58	MISCELLANEOUS FACILITIES .....	151
10-1.59	SLOPE PROTECTION .....	151
10-1.60	MISCELLANEOUS CONCRETE CONSTRUCTION .....	151
10-1.61	MISCELLANEOUS IRON AND STEEL .....	151
10-1.62	CHAIN LINK FENCE .....	151
10-1.63	MARKERS AND DELINEATORS .....	151
10-1.64	MODIFIED METAL BEAM GUARD RAILING (TYPE A) .....	152
10-1.65	CONCRETE BARRIER .....	153
10-1.66	THERMOPLASTIC TRAFFIC STRIPES (SPRAYABLE) .....	155
10-1.67	THERMOPLASTIC TRAFFIC STRIPES (RECESSED) .....	155
10-1.68	PAINT PAVEMENT MARKINGS .....	156
10-1.69	PAVEMENT MARKERS .....	157
SECTION 10-2. (BLANK) .....		157
SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS .....		157
10-3.01	DESCRIPTION .....	157
10-3.02	COST BREAK-DOWN .....	157
10-3.03	EXCAVATING AND BACKFILLING .....	158
10-3.04	CONDUIT .....	158
10-3.05	PULL BOXES .....	158
10-3.06	TRAFFIC PULL BOXES .....	159
10-3.07	CONDUCTORS AND WIRING .....	159
10-3.08	SERVICE .....	160
10-3.09	NUMBERING ELECTRICAL EQUIPMENT .....	161
10-3.10	FLASHING BEACONS .....	161
10-3.11	PREFORMED INDUCTIVE LOOPS .....	161

10-3.12	EXTINGUISHABLE MESSAGE SIGN.....	162
10-3.13	MODEL 500 CHANGEABLE MESSAGE SIGN SYSTEM .....	163
10-3.14	MODEL 170 BASED CABINETS.....	164
10-3.15	TESTING.....	164
10-3.16	CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM .....	164
10-3.17	HIGHWAY ADVISORY RADIO SYSTEM.....	171
10-3.18	REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT.....	182
10-3.19	PAYMENT .....	182
SECTION 10-4.	FIBER OPTIC CABLE PLANT SPECIFICATIONS .....	182
10-4.01	FIBER OPTICS GLOSSARY .....	182
10-4.02	FIBER OPTIC OUTSIDE PLANT CABLE .....	184
10-4.02A	GENERAL.....	184
10-4.02B	FIBER CHARACTERISTICS.....	185
10-4.02C	COLOR CODING .....	186
10-4.02D	CABLE CONSTRUCTION .....	186
10-4.02E	GENERAL CABLE PERFORMANCE SPECIFICATIONS.....	187
10-4.02F	PACKAGING AND SHIPPING REQUIREMENTS .....	187
10-4.03	LABELING .....	188
10-4.03A	GENERAL.....	188
10-4.03B	LABEL IDENTIFICATION.....	188
10-4.03C	LABEL PLACEMENT.....	190
10-4.04	CABLE INSTALLATION .....	191
10-4.05	SPLICING .....	192
10-4.06	SPLICE CLOSURES.....	192
10-4.06A	OUTDOOR SPLICES .....	192
10-4.07	SPLICE TRAYS.....	192
10-4.08	PASSIVE CABLE ASSEMBLIES AND COMPONENTS .....	193
10-4.09	FIBER OPTIC CABLE TERMINATIONS .....	193
10-4.09A	GENERAL.....	193
10-4.09B	CABLE TERMINATION.....	193
10-4.09C	DISTRIBUTION INTERCONNECT PACKAGE.....	193
10-4.09D	FIBER OPTIC CABLE ASSEMBLIES AND PIGTAILS .....	193
10-4.09E	FIBER DISTRIBUTION UNIT.....	194
10-4.09F	FAN OUT TERMINATION .....	194
10-4.10	FIBER OPTIC TESTING.....	195
10-4.10A	GENERAL.....	195
10-4.10B	FACTORY TESTING .....	195
10-4.10C	ARRIVAL ON SITE.....	195
10-4.10D	AFTER CABLE INSTALLATION .....	195
10-4.10E	SYSTEM CABLE VERIFICATION AT COMPLETION.....	195
10-4.10F	PASSIVE COMPONENT PACKAGE TESTING AND DOCUMENTATION.....	196
10-4.10G	FIBER OPTIC SYSTEM PERFORMANCE MARGIN DESIGN CRITERIA.....	196
10-4.10H	ACTIVE COMPONENT TESTING .....	196
10-4.11	PAYMENT .....	203
SECTION 11.	(BLANK).....	203
SECTION 12.	(BLANK).....	203
SECTION 13.	RAILROAD RELATIONS AND INSURANCE.....	203
SECTION 13-1.	RELATIONS WITH RAILROAD COMPANY .....	203
SECTION 13-2.	RAILROAD PROTECTIVE INSURANCE.....	206
SECTION 14.	FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS .....	217
FEDERAL REQUIREMENT TRAINING	SPECIAL PROVISIONS .....	236



# STANDARD PLANS LIST

The Standard Plan sheets applicable to this contract include, but are not limited to those indicated below. The Revised Standard Plans (RSP) and New Standard Plans (NSP) which apply to this contract are included as individual sheets of the project plans.

A10A	Abbreviations
A10B	Symbols
A20A	Pavement Markers and Traffic Lines - Typical Details
A20B	Pavement Markers and Traffic Lines - Typical Details
A20C	Pavement Markers and Traffic Lines - Typical Details
A20D	Pavement Markers and Traffic Lines - Typical Details
A24A	Pavement Markings - Arrows
A24D	Pavement Markings - Words
A24E	Pavement Markings - Words and Crosswalks
A35A	Portland Cement Concrete Paving Details
A62A	Excavation and Backfill - Miscellaneous Details
A62B	Limits of Payment for Excavation and Backfill - Bridge Surcharge and Wall
A73A	Object Markers
A73B	Markers
A73C	Delineators, Channelizers and Barricades
A76H	Concrete Barrier Type 60S
RSP A77A	<i>Metal Beam Guard Railing - Wood Posts and Wood Blocks</i>
RSP A77B	<i>Metal Beam Guard Railing - Standard Hardware</i>
RSP A77C	<i>Metal Beam Guard Railing - Wood Posts and Wood Blocks</i>
RSP A77D	<i>Guard Railing Typical Layouts</i>
RSP A77E	<i>Guard Railing Typical Layouts</i>
RSP A77F	<i>Metal Beam Guard Railing - Typical Embankment Widening for End Treatments</i>
NSP A77FA	<i>Metal Beam Guard Railing - Typical Line Post Installations</i>
RSP A77G	<i>Guard Railing End Anchor (Breakaway, Type B)</i>
A77H	Guard Railing End Anchors - Breakaway Hardware
A77I	Barrier and Guard Railing End Anchors
RSP A77J	<i>Guard Railing Connections to Bridge Railings, Retaining Walls and Abutments</i>
NSP A77L	<i>Guard Railing and Barrier Railing End Treatment</i>
NSP A77M	<i>Guard Railing and Barrier Railing End Treatment</i>
NSP A77N	<i>Guard Railing and Barrier Railing End Treatment</i>
A85	Chain Link Fence
C7A	Reinforced Concrete Crib Wall - Battered Wall, Types A, B and C
RSP C7E	<i>Reinforced Concrete Crib Wall - Types A, B, C, D, E and F Header and Stretcher Details</i>
RSP C7F	<i>Design Data for Reinforced Concrete Crib Wall - Foundation Pressure, Battered Wall</i>
D72	Drainage Inlets
D73	Drainage Inlets
D74B	Drainage Inlets
D74C	Drainage Inlet Details
RSP D77A	<i>Grate Details</i>
D78	Gutter Depressions
D87A	Overside Drains
D87B	Overside Drains
D87C	Underdrains
D93B	Drainage Inlet Riser Connections
D94A	Metal and Plastic Flared End Sections

D97A	Corrugated Metal Pipe - Coupling Details No. 1, Annular Coupling Band Bar and Strap and Angle Connectors
D97D	Corrugated Metal Pipe - Coupling Details No. 4, Hugger Coupling Bands
D97E	Corrugated Metal Pipe - Coupling Details No. 5, Standard Joint
D97F	Corrugated Metal Pipe - Coupling Details No. 6, Positive Joint
D97G	Corrugated Metal Pipe - Coupling Details No. 7, Positive Joints and Downdrains
D99B	Edge Drain Outlet and Vent Details
D99C	Edge Drain Cleanout and Vent Details
D99D	Cross Drain Interceptor Details
NSP T1A	<i>Temporary Crash Cushion, Sand Filled (Unidirectional)</i>
NSP T1B	<i>Temporary Crash Cushion, Sand Filled (Bidirectional)</i>
RSP T2	<i>Temporary Crash Cushion, Sand Filled (Shoulder Installations)</i>
T3	Temporary Railing (Type K)
RSP T7	<i>Construction Project Information Signs</i>
T10	Traffic Control System for Lane Closure On Freeways and Expressways
T13	Traffic Control System for Lane Closure On Two Lane Conventional Highways
T14	Traffic Control System for Ramp Closures
RSP T15	<i>Traffic Control System for Moving Lane Closure On Multilane Highways</i>
RSP T16	<i>Traffic Control System for Moving Lane Closure On Multilane Highways</i>
B6-21	Joint Seals (Maximum Movement Rating = 50 mm)
RS1	Roadside Signs - Typical Installation Details No. 1
RS2	Roadside Signs - Wood Post, Typical Installation Details No. 2
RS4	Roadside Signs - Typical Installation Details No. 4
S1	Overhead Signs-Truss - Instructions and Examples
S2	Overhead Signs-Truss - Single Post Type, Post Types II through VII
RSP S4	<i>Overhead Signs-Truss - Single Post Type, Structural Frame Members</i>
S6	Overhead Signs-Truss - Structural Frame Details
S7	Overhead Signs-Truss - Frame Juncture Details
RSP S8C	<i>Overhead Signs-Truss - Sign Mounting Details, Laminated Panel-Type A</i>
S9	Overhead Signs - Walkway Details No. 1
S10	Overhead Signs - Walkway Details No. 2
RSP S11	<i>Overhead Signs - Walkway Safety Railing Details</i>
RSP S13	<i>Overhead Signs-Truss - Pile Foundation</i>
ES-1A	Signal, Lighting and Electrical Systems - Symbols and Abbreviations
ES-1B	Signal, Lighting and Electrical Systems - Symbols and Abbreviations
ES-2A	Signal, Lighting and Electrical Systems - Service Equipment
ES-2B	Signal, Lighting and Electrical Systems - Service Equipment
ES-2C	Signal, Lighting and Electrical Systems - Service Equipment Notes
ES-2D	Signal, Lighting and Electrical Systems - Service Equipment and Typical Wiring Diagram, Type A
ES-2E	Signal, Lighting and Electrical Systems - Service Equipment and Typical Wiring Diagram, Type B
ES-4B	Signal, Lighting and Electrical Systems - Controller Cabinet Details
ES-4C	Signal, Lighting and Electrical Systems - Controller Cabinet Details
ES-5A	Signal, Lighting and Electrical Systems - Detectors
ES-5B	Signal, Lighting and Electrical Systems - Detectors
ES-5D	Signal, Lighting and Electrical Systems - Detectors
ES-5E	Signal, Lighting and Electrical Systems - Detectors
ES-6A	Signal and Lighting Standards - Type 1 Standards and Equipment Numbering
ES-6AA	Signal Standards - Push Button Posts
ES-6B	Lighting Standards - Types 15, 21 and 22
ES-6D	Lighting Standards - Types 30 and 31
ES-6E	Lighting Standards - Type 30 and 31, Base Plate Details
ES-6S	Signal and Lighting Standards - Details No. 1
ES-6T	Signal and Lighting Standards - Details No. 2
ES-6TA	Signal and Lighting Standards - Pole and Mast Arm Alternatives

ES-7A	Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations
ES-7B	Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations
ES-7C	Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations
ES-7D	Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations
ES-8	Signal, Lighting and Electrical Systems - Pull Box Details
ES-9A	Signal, Lighting and Electrical Systems - Cantilever Flashing Beacon, Types 9, 9A and 9B
ES-9B	Signal, Lighting and Electrical Systems - Cantilever Flashing Beacon, Types 9, 9A and 9B
ES-10	Signal, Lighting and Electrical Systems - Isolux Diagrams
ES-11	Signal, Lighting and Electrical Systems - Foundation Installations
ES-13	Signal, Lighting and Electrical Systems - Splicing Details
ES-14	Signal, Lighting and Electrical Systems - Wiring Details and Fuse Ratings
ES-27B	Signal, Lighting and Electrical Systems - Extinguishable Message Sign, 250 mm Letters
ES-28	Signal, Lighting and Electrical Systems - Extinguishable Message Sign and Flashing Beacons
ES-29	Sign Illumination - Mercury Sign Illumination Equipment
ES-32A	Sign Illumination - Sign Illumination Equipment
ES-32B	Sign Illumination - Sign Illumination Control
<i>RSP ES-34A</i>	<i>Closed Circuit Television - Pole Details</i>
ES-34B	Closed Circuit Television - Pole Details, Overhead Sign Mounted

Federal Project with DBE Goals (12-01-99)

## DEPARTMENT OF TRANSPORTATION

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## NOTICE TO CONTRACTORS

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**CONTRACT NO. 03-1A80U4**

**03-Pla-80-62.7/88.2**

Sealed proposals for the work shown on the plans entitled:

**STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR CONSTRUCTION  
ON STATE HIGHWAY IN PLACER COUNTY FROM MAGRA OVERHEAD TO PUTTS LAKE  
UNDERCROSSING**

will be received at the Department of Transportation, 1120 N Street, Room 0200, MS #26, Sacramento, CA 95814, until 2 o'clock p.m. on June 28, 2000, at which time they will be publicly opened and read in Room 0100 at the same address.

Proposal forms for this work are included in a separate book entitled:

**STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROPOSAL AND CONTRACT FOR  
CONSTRUCTION ON STATE HIGHWAY IN PLACER COUNTY FROM MAGRA OVERHEAD TO PUTTS  
LAKE UNDERCROSSING**

General work description: Existing highway to be rehabilitated by grading and paving with portland cement concrete and asphalt concrete; median concrete barriers to be constructed.

This project has a goal of 20 percent disadvantaged business enterprise (DBE) participation.  
No prebid meeting is scheduled for this project.

Contract No. 03-1A80U4

**THIS PROJECT IS SUBJECT TO THE "BUY AMERICA" PROVISIONS OF THE SURFACE  
TRANSPORTATION ASSISTANCE ACT OF 1982 AS AMENDED BY THE INTERMODAL SURFACE  
TRANSPORTATION EFFICIENCY ACT OF 1991.**

Bids are required for the entire work described herein.

At the time this contract is awarded, the Contractor shall possess either a Class A license or a combination of Class C licenses which constitutes a majority of the work.

This contract is subject to state contract nondiscrimination and compliance requirements pursuant to Government Code, Section 12990.

The District in which the work for this project is located has been incorporated into the Department's Northern Region. References in the Standard Specifications or in the special provisions to the district shall be deemed to mean the Northern Region. The office of the District Director for the Northern Region is located at Marysville.

Project plans, special provisions, and proposal forms for bidding this project can only be obtained at the Department of Transportation, Plans and Bid Documents, Room 0200, MS #26, Transportation Building, 1120 N Street, Sacramento, California 95814, FAX No. (916) 654-7028, Telephone No. (916) 654-4490. Use FAX orders to expedite orders for project plans, special provisions and proposal forms. FAX orders must include credit card charge number, card expiration date and authorizing signature. Project plans, special provisions, and proposal forms may be seen at the above Department of Transportation office and at the offices of the District Directors of Transportation at Irvine, Oakland, and the district in which the work is situated. Standard Specifications are available through the State of California, Department of Transportation, Publications Unit, 1900 Royal Oaks Drive, Sacramento, CA 95815, Telephone No. (916) 445-3520.

Cross sections for this project are available at the office of the District Director of Transportation of the district in which the work is situated in paper copy format.

The successful bidder shall furnish a payment bond and a performance bond.

The Department of Transportation hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation.

The U.S. Department of Transportation (DOT) provides a toll-free "hotline" service to report bid rigging activities. Bid rigging activities can be reported Mondays through Fridays, between 8:00 a.m. and 5:00 p.m., eastern time, Telephone No. 1-800-424-9071. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report these activities. The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county, or counties, in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at the Labor Compliance Office at the offices of the District Director of Transportation for the district in which the work is situated, and available from the California Department of Industrial Relations' Internet Web Site at: <http://www.dir.ca.gov>. The Federal minimum wage rates for this project as predetermined by the United States Secretary of Labor are set forth in the books issued for bidding purposes entitled "Proposal and Contract," and in copies of this book that may be examined at the offices described above where project plans, special provisions, and proposal forms may be seen. Addenda to modify the Federal minimum wage rates, if necessary, will be issued to holders of "Proposal and Contract" books. Future effective general prevailing wage rates which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

Attention is directed to the Federal minimum wage rate requirements in the books entitled "Proposal and Contract." If there is a difference between the minimum wage rates predetermined by the Secretary of Labor and the general prevailing wage rates determined by the Director of the California Department of Industrial Relations for similar classifications of labor, the Contractor and subcontractors shall pay not less than the higher wage rate. The Department will not accept lower State wage rates not specifically included in the Federal minimum wage determinations. This includes "helper" (or other classifications based on hours of experience) or any other classification not appearing in the Federal wage determinations. Where Federal wage determinations do not contain the State wage rate determination otherwise available for use by the Contractor and subcontractors, the Contractor and subcontractors shall pay not less than the Federal minimum wage rate which most closely approximates the duties of the employees in question.

DEPARTMENT OF TRANSPORTATION

Deputy Director Transportation Engineering

Dated May 15, 2000

HZ

**COPY OF ENGINEER'S ESTIMATE**  
**(NOT TO BE USED FOR BIDDING PURPOSES)**  
**03-1A80U4**

Item	Item Code	Item	Unit of Measure	Estimated Quantity
1	070010	PROGRESS SCHEDULE (CRITICAL PATH)	LS	LUMP SUM
2	018310	OVERHEAD	WDAY	260
3 (S)	018311	TEMPORARY FENCE (ENVIRONMENTALLY SENSITIVE AREA)	M	1890
4	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM
5	074020	WATER POLLUTION CONTROL	LS	LUMP SUM
6 (S)	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
7 (S)	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
8 (S)	120151	TEMPORARY TRAFFIC STRIPE (TAPE)	M	30 100
9 (S)	120159	TEMPORARY TRAFFIC STRIPE (PAINT)	M	196 000
10 (S)	018312	TRAFFIC PLASTIC DRUM	EA	330
11 (S)	128650	PORTABLE CHANGEABLE MESSAGE SIGN	LS	LUMP SUM
12 (S)	018313	PORTABLE RADAR TRAILER	EA	2
13	129000	TEMPORARY RAILING (TYPE K)	M	27 200
14	150305	OBLITERATE SURFACING	M2	490
15	150662	REMOVE METAL BEAM GUARD RAILING	M	10 900
16	150667	REMOVE DOUBLE METAL BEAM BARRIER	M	2820
17	150668	REMOVE FLARED END SECTION	EA	39
18	150710	REMOVE TRAFFIC STRIPE	M	63 200
19	150742	REMOVE ROADSIDE SIGN	EA	160
20	150771	REMOVE ASPHALT CONCRETE DIKE	M	21 100

Item	Item Code	Item	Unit of Measure	Estimated Quantity
21	150820	REMOVE INLET	EA	5
22	150823	REMOVE DOWNDRAIN	EA	28
23	150859	REMOVE ASPHALT CONCRETE OVERSIDE DRAIN	EA	7
24	150870	REMOVE CONCRETE DECK SURFACE	M2	4842
25 (S)	151540	RECONSTRUCT CHAIN LINK FENCE	M	1300
26 (S)	018314	RECONSTRUCT MODIFIED METAL BEAM GUARD RAILING (TYPE A)	M	1440
27	152430	ADJUST INLET	EA	81
28	018315	MODIFY WRECKER ANCHOR	EA	18
29	018316	300 MM PLASTIC PIPE-LINER	M	42
30	152666	400 MM PLASTIC PIPE-LINER	M	550
31	152668	525 MM PLASTIC PIPE-LINER	M	2770
32	152669	675 MM PLASTIC PIPE-LINER	M	210
33	018317	800 MM PLASTIC PIPE-LINER	M	370
34	018318	900 MM PLASTIC PIPE-LINER	M	180
35	018319	1200 MM PLASTIC PIPE-LINER	M	59
36	152703	REMODEL INLET	EA	4
37	018320	RUMBLE STRIPS IN PORTLAND CEMENT CONCRETE PAVEMENT (GROUND-IN)	M	990
38 (S)	153155	COLD PLANE ASPHALT CONCRETE PAVEMENT (75 MM MAXIMUM)	M2	4200
39	153214	REMOVE CONCRETE CURB	M	1280
40	153218	REMOVE CONCRETE SIDEWALK	M2	48

Item	Item Code	Item	Unit of Measure	Estimated Quantity
41	153221	REMOVE CONCRETE BARRIER	M	13 400
42	018321	REMOVE SALT BUNKER	EA	1
43	155003	CAP INLET	EA	5
44	157560	BRIDGE REMOVAL (PORTION)	LS	LUMP SUM
45	160101	CLEARING AND GRUBBING	LS	LUMP SUM
46	190101	ROADWAY EXCAVATION	M3	121 000
47	192036	STRUCTURE EXCAVATION (CRIB WALL)	M3	670
48	193012	STRUCTURE BACKFILL (CRIB WALL)	M3	1230
49	018322	ARRESTOR BED AGGREGATE	M3	1220
50	198007	IMPORTED MATERIAL (SHOULDER BACKING)	TONN	42 300
51	018323	GEOSYNTHETIC REINFORCED EMBANKMENT	M2	66 600
52 (S)	203001	EROSION CONTROL (BLANKET)	M2	20 400
53 (S)	203016	EROSION CONTROL (TYPE D)	M2	6000
54 (S)	018324	EROSION CONTROL (MULCH)	M2	720
55 (S)	203021	FIBER ROLLS	M	1460
56 (S)	204017	PLANT (GROUP W)	EA	1000
57	260201	CLASS 2 AGGREGATE BASE	M3	44 300
58	260210	AGGREGATE BASE (APPROACH SLAB)	M3	56
59	377501	SLURRY SEAL	TONN	400
60	390095	REPLACE ASPHALT CONCRETE SURFACING	M3	3810



Item	Item Code	Item	Unit of Measure	Estimated Quantity
61	390155	ASPHALT CONCRETE (TYPE A)	TONN	162 000
62	391031	PAVING ASPHALT (BINDER-PAVEMENT REINFORCING FABRIC)	TONN	4.6
63	393001	PAVEMENT REINFORCING FABRIC	M2	4200
64	394002	PLACE ASPHALT CONCRETE (MISCELLANEOUS AREA)	M2	124 000
65	394040	PLACE ASPHALT CONCRETE DIKE (TYPE A)	M	4930
66	394046	PLACE ASPHALT CONCRETE DIKE (TYPE D)	M	10 700
67	394048	PLACE ASPHALT CONCRETE DIKE (TYPE E)	M	4800
68	394049	PLACE ASPHALT CONCRETE DIKE (TYPE F)	M	1970
69	397001	ASPHALTIC EMULSION (PAINT BINDER)	TONN	710
70	401000	CONCRETE PAVEMENT	M3	181 000
71	401100	REPLACE CONCRETE PAVEMENT	M3	4740
72	018325	INTERMEDIATE PAVEMENT ANCHORS	EA	6
73	404092	SEAL PAVEMENT JOINT	M	321 000
74	415101	CRACK EXISTING CONCRETE PAVEMENT	M2	180 000
75 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	M3	3.5
76	510087	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE R)	M3	548
77 (F)	510502	MINOR CONCRETE (MINOR STRUCTURE)	M3	97
78	018326	MINOR CONCRETE (SHOULDER BARRIER SLAB AND FOOTING)	M3	9170
79	510800	PAVING NOTCH EXTENSION	M3	6.4
80	511106	DRILL AND BOND DOWEL	M	43

Item	Item Code	Item	Unit of Measure	Estimated Quantity
81	513601	REINFORCED CONCRETE CRIB WALL (TYPE A)	M2	450
82	515041	FURNISH POLYESTER CONCRETE OVERLAY	M3	97
83 (F)	515042	PLACE POLYESTER CONCRETE OVERLAY	M2	4842
84 (S)	519117	JOINT SEAL (MR 30 MM)	M	144
85 (S)	519120	JOINT SEAL (MR 15 MM)	M	82
86 (S-F)	520110	BAR REINFORCING STEEL (EPOXY COATED) (BRIDGE)	KG	382
87 (F)	560203	FURNISH SIGN STRUCTURE (BRIDGE MOUNTED WITH WALKWAY)	KG	3290
88 (S-F)	560204	INSTALL SIGN STRUCTURE (BRIDGE MOUNTED WITH WALKWAY)	KG	3290
89 (F)	560208	FURNISH SIGN STRUCTURE (TUBULAR)	KG	20 520
90 (S-F)	560209	INSTALL SIGN STRUCTURE (TUBULAR)	KG	20 520
91 (F)	560218	FURNISH SIGN STRUCTURE (TRUSS)	KG	34 573
92 (S-F)	560219	INSTALL SIGN STRUCTURE (TRUSS)	KG	34 573
93 (S)	561008	760 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	49
94 (S)	561009	920 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	4
95 (S)	561012	1220 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	22
96	566011	ROADSIDE SIGN - ONE POST	EA	72
97	566012	ROADSIDE SIGN - TWO POST	EA	34
98	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	73
99	650069	450 MM REINFORCED CONCRETE PIPE	M	800
100	664015	450 MM CORRUGATED STEEL PIPE (2.01 MM THICK)	M	880

Item	Item Code	Item	Unit of Measure	Estimated Quantity
101	665734	450 MM SLOTTED CORRUGATED STEEL PIPE (4.27 MM THICK)	M	180
102	690160	300 MM CORRUGATED STEEL PIPE DOWNDRAIN (2.01 MM THICK)	M	300
103	692088	300 MM ENTRANCE TAPER	EA	22
104	692245	300 MM DOWNDRAIN SLIP JOINT	EA	22
105	692383	300 MM ANCHOR ASSEMBLY	EA	22
106	705044	450 MM STEEL FLARED END SECTION	EA	31
107	705045	600 MM STEEL FLARED END SECTION	EA	27
108	705047	750 MM STEEL FLARED END SECTION	EA	2
109	705048	900 MM STEEL FLARED END SECTION	EA	3
110	705049	1050 MM STEEL FLARED END SECTION	EA	2
111	705051	1350 MM STEEL FLARED END SECTION	EA	1
112	720119	ROCK SLOPE PROTECTION (1T, METHOD A)	TONN	210
113	720120	ROCK SLOPE PROTECTION (1/2T, METHOD A)	M3	910
114	721010	ROCK SLOPE PROTECTION (BACKING NO. 1, METHOD B)	M3	49
115	721011	ROCK SLOPE PROTECTION (BACKING NO. 2, METHOD B)	M3	260
116	721012	ROCK SLOPE PROTECTION (BACKING NO. 3, METHOD B)	M3	270
117	729010	ROCK SLOPE PROTECTION FABRIC	M2	2370
118	731505	MINOR CONCRETE (CURB AND SIDEWALK)	M3	7
119 (S-F)	750001	MISCELLANEOUS IRON AND STEEL	KG	7844
120 (S)	800391	CHAIN LINK FENCE (TYPE CL-1.8)	M	300

Item	Item Code	Item	Unit of Measure	Estimated Quantity
121 (S)	802595	3.0 M CHAIN LINK GATE (TYPE CL-1.8)	EA	13
122	018327	CONCRETE BARRIER DELINEATOR (400 MM)	EA	67
123	820108	DELINEATOR (CLASS 2)	EA	1410
124	018328	MARKER (CONCRETE PAVEMENT ANCHOR)	EA	6
125	820114	KILOMETER POST MARKER	EA	43
126	018329	CONCRETE BARRIER MARKER (NON-IMPACTABLE)	EA	1120
127	820151	OBJECT MARKER (TYPE L-1)	EA	70
128 (S)	018330	MODIFIED METAL BEAM GUARD RAILING (TYPE A)	M	9810
129 (S)	839565	TERMINAL SYSTEM (TYPE SRT)	EA	66
130	018332	CONCRETE BARRIER (TRANSITION)	M	20
131	018331	CONCRETE BARRIER (TYPE 60R)	M	130
132	839710	CONCRETE BARRIER (TYPE 60S)	M	4070
133	839712	CONCRETE BARRIER (TYPE 60SC)	M	12 100
134	839720	CONCRETE BARRIER (TYPE 732)	M	3990
135 (S)	840560	THERMOPLASTIC TRAFFIC STRIPE (SPRAYABLE)	M	110 000
136 (S)	018333	100 MM THERMOPLASTIC TRAFFIC STRIPE (RECESSED, BROKEN 5.18 M - 2.14 M)	M	630
137 (S)	840573	100 MM THERMOPLASTIC TRAFFIC STRIPE (RECESSED, BROKEN 10.98 M - 3.66 M)	M	56 700
138 (S)	018334	200 MM THERMOPLASTIC TRAFFIC STRIPE (RECESSED, BROKEN 3.66 M - 0.92 M)	M	440
139 (S)	018335	200 MM THERMOPLASTIC TRAFFIC STRIPE (RECESSED)	M	5550
140 (S)	840666	PAINT PAVEMENT MARKING (2-COAT)	M2	630

Item	Item Code	Item	Unit of Measure	Estimated Quantity
141 (S)	860520	HIGHWAY ADVISORY RADIO SYSTEM	LS	LUMP SUM
142 (S)	860889	MODIFY TRAFFIC MONITORING STATION	LS	LUMP SUM
143 (S)	860990	CLOSED CIRCUIT TELEVISION SYSTEM	LS	LUMP SUM
144 (S)	861504	MODIFY LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM
145 (S)	867017	48 SINGLEMODE FIBER OPTIC CABLE	LS	LUMP SUM
146	999990	MOBILIZATION	LS	LUMP SUM

**STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION**

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**SPECIAL PROVISIONS**

**Annexed to Contract No. 03-1A80U4**

**SECTION 1. SPECIFICATIONS AND PLANS**

The work embraced herein shall conform to the provisions in the Standard Specifications dated July 1995, and the Standard Plans dated July 1997, of the Department of Transportation insofar as the same may apply, and these special provisions.

Amendments to the Standard Specifications set forth in these special provisions shall be considered as part of the Standard Specifications for the purposes set forth in Section 5-1.04, "Coordination and Interpretation of Plans, Standard Specifications and Special Provisions," of the Standard Specifications. Whenever either the term "Standard Specifications is amended" or the term "Standard Specifications are amended" is used in the special provisions, the indented text following said term shall be considered an amendment to the Standard Specifications. In case of conflict between such amendments and the Standard Specifications, the amendments shall take precedence over and be used in lieu of the conflicting portions.

The District in which the work for this project is located has been incorporated into the Department's Northern Region. References in the Standard Specifications or in these special provisions to the district shall be deemed to mean the Northern Region. The office of the District Director for the Northern Region is located at Marysville.

In case of conflict between the Standard Specifications and these special provisions, the special provisions shall take precedence over and be used in lieu of the conflicting portions.

**SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS**

**2-1.01 GENERAL**

The bidder's attention is directed to the provisions in Section 2, "Proposal Requirements and Conditions," of the Standard Specifications and these special provisions for the requirements and conditions which the bidder must observe in the preparation of the Proposal form and the submission of the bid.

In addition to the subcontractors required to be listed in conformance with Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications, each proposal shall have listed therein the portion of work that will be performed by each subcontractor listed.

The Bidder's Bond form mentioned in the last paragraph in Section 2-1.07, "Proposal Guaranty," of the Standard Specifications will be found following the signature page of the Proposal.

Submit request for substitution of an "or equal" item, and the data substantiating the request to the Department of Transportation, P.O. Box 911, Marysville, CA 95901, Attn: NRCO/Contract Administration Engineer, so that the request is received by the Department by close of business on the fourth day, not including Saturdays, Sundays and legal holidays, following bid opening.

In conformance with Public Contract Code Section 7106, a Noncollusion Affidavit is included in the Proposal. Signing the Proposal shall also constitute signature of the Noncollusion Affidavit.

The contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate. Each subcontract signed by the bidder must include this assurance.

**2-1.015 FEDERAL LOBBYING RESTRICTIONS**

Section 1352, Title 31, United States Code prohibits Federal funds from being expended by the recipient or any lower tier subrecipient of a Federal-aid contract to pay for any person for influencing or attempting to influence a Federal agency or Congress in connection with the awarding of any Federal-aid contract, the making of any Federal grant or loan, or the entering into of any cooperative agreement.

If any funds other than Federal funds have been paid for the same purposes in connection with this Federal-aid contract, the recipient shall submit an executed certification and, if required, submit a completed disclosure form as part of the bid documents.

A certification for Federal-aid contracts regarding payment of funds to lobby Congress or a Federal agency is included in the Proposal. Standard Form - LLL, "Disclosure of Lobbying Activities," with instructions for completion of the Standard Form is also included in the Proposal. Signing the Proposal shall constitute signature of the Certification.

The above-referenced certification and disclosure of lobbying activities shall be included in each subcontract and any lower-tier contracts exceeding \$100,000. All disclosure forms, but not certifications, shall be forwarded from tier to tier until received by the Engineer.

The Contractor, subcontractors and any lower-tier contractors shall file a disclosure form at the end of each calendar quarter in which there occurs any event that requires disclosure or that materially affects the accuracy of the information contained in any disclosure form previously filed by the Contractor, subcontractors and any lower-tier contractors. An event that materially affects the accuracy of the information reported includes:

- A. A cumulative increase of \$25,000 or more in the amount paid or expected to be paid for influencing or attempting to influence a covered Federal action; or
- B. A change in the person(s) or individual(s) influencing or attempting to influence a covered Federal action; or,
- C. A change in the officer(s), employee(s), or Member(s) contacted to influence or attempt to influence a covered Federal action.

## **2-1.02 DISADVANTAGED BUSINESS ENTERPRISE (DBE)**

This project is subject to Part 26, Title 49, Code of Federal Regulations entitled "Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs." The Regulations in their entirety are incorporated herein by this reference.

Bidders shall be fully informed respecting the requirements of the Regulations and the Department's Disadvantaged Business Enterprise (DBE) program developed pursuant to the Regulations; particular attention is directed to the following matters:

- A. A DBE must be a small business concern as defined pursuant to Section 3 of U.S. Small Business Act and relevant regulations promulgated pursuant thereto.
- B. A DBE may participate as a prime contractor, subcontractor, joint venture partner with a prime or subcontractor, vendor of material or supplies, or as a trucking company.
- C. A DBE bidder, not bidding as a joint venture with a non-DBE, will be required to document one or a combination of the following:
  - 1. The bidder will meet the goal by performing work with its own forces.
  - 2. The bidder will meet the goal through work performed by DBE subcontractors, suppliers or trucking companies.
  - 3. The bidder, prior to bidding, made adequate good faith efforts to meet the goal.
- D. A DBE joint venture partner must be responsible for specific contract items of work, or portions thereof. Responsibility means actually performing, managing and supervising the work with its own forces. The DBE joint venture partner must share in the capital contribution, control, management, risks and profits of the joint venture. The DBE joint venturer must submit the joint venture agreement with the proposal or the DBE Information form required in the Section entitled "Submission of DBE Information" of these special provisions.
- E. A DBE must perform a commercially useful function, i.e., must be responsible for the execution of a distinct element of the work and must carry out its responsibility by actually performing, managing and supervising the work.
- F. DBEs must be certified by either the California Department of Transportation, or by a participating State of California or local agency which certifies in conformance with Title 49, Code of Federal Regulations, Part 26, as of the date of bid opening. It is the Contractor's responsibility to verify that DBEs are certified. Listings of DBEs certified by the Department are available from the following sources:
  - 1. The Department's DBE Directory, which is published quarterly. This Directory may be obtained from the Department of Transportation, Materiel Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520.
  - 2. The Department's Electronic Information Bulletin Board Service, which is accessible by modem and is updated weekly. The Bulletin Board may be accessed by first contacting the Department's Business Enterprise Program at Telephone: (916) 227-8937 and obtaining a user identification and password.
  - 3. The Department's web site at <http://www.dot.ca.gov/hq/bep/index.htm>.
  - 4. The organizations listed in the Section entitled "DBE Goal for this Project" of these special provisions.

G. Credit for materials or supplies purchased from DBEs will be as follows:

1. If the materials or supplies are obtained from a DBE manufacturer, 100 percent of the cost of the materials or supplies will count toward the DBE goal. A DBE manufacturer is a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of the general character described by the specifications.
2. If the materials or supplies are purchased from a DBE regular dealer, 60 percent of the cost of the materials or supplies will count toward the DBE goal. A DBE regular dealer is a firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a DBE regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A person may be a DBE regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business as provided in this paragraph G.2. if the person both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment shall be by a long-term lease agreement and not on an ad hoc or contract-by-contract basis. Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not DBE regular dealers within the meaning of this paragraph G.2.
3. Credit for materials or supplies purchased from a DBE which is neither a manufacturer nor a regular dealer will be limited to the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site, provided the fees are reasonable and not excessive as compared with fees charged for similar services.

H. Credit for DBE trucking companies will be as follows:

1. The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there cannot be a contrived arrangement for the purpose of meeting the DBE goal.
2. The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
3. The DBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs.
4. The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the contract.
5. The DBE may also lease trucks from a non-DBE firm, including an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by a DBE.
6. For the purposes of this paragraph H, a lease must indicate that the DBE has exclusive use of and control over the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE.

I. Noncompliance by the Contractor with the requirements of the regulations constitutes a breach of this contract and may result in termination of the contract or other appropriate remedy for a breach of this contract.

J. Bidders are encouraged to use services offered by financial institutions owned and controlled by DBEs.

#### **2-1.02A DBE GOAL FOR THIS PROJECT**

The Department has established the following goal for Disadvantaged Business Enterprise (DBE) participation for this project:

Disadvantaged Business Enterprise (DBE): 20 percent

Bidders may use the services of the following firms to contact interested DBEs. These firms are available to assist DBEs in preparing bids for subcontracting or supplying materials.



The following firms may be contacted for projects in the following locations:

<p>Districts 04, 05 (except San Luis Obispo and Santa Barbara Counties), 06 (except Kern County) and 10:</p> <p>Triaxial Management Services, Inc. - Oakland</p> <p>1545 Willow Street, 1st Floor Oakland, CA 94607 Telephone - (510) 286-1313 FAX No. - (510) 286-6792</p>	<p>Districts 08, 11 and 12:</p> <p>Triaxial Management Services, Inc. - San Diego 2725 Congress Street, Suite 1-D San Diego, CA 92110 Telephone - (619) 543-5109 FAX No. - (619) 543-5108</p>
<p>Districts 07 and 08; in San Luis Obispo and Santa Barbara Counties in District 05; and in Kern County in District 06:</p> <p>Triaxial Management Services, Inc. - Los Angeles 2594 Industry Way, Suite 101 Lynwood, CA 90262 Telephone - (310) 537-6677 FAX No. - (310) 637-0128</p>	<p>Districts 01, 02, 03 and 09:</p> <p>Triaxial Management Services, Inc. - Sacramento 930 Alhambra Blvd., #205 Sacramento, CA 95816 Telephone - (916) 553-4172 FAX No. - (916) 553-4173</p>

## 2-1.02B SUBMISSION OF DBE INFORMATION

The required DBE information shall be submitted on the "CALTRANS BIDDER - DBE INFORMATION" form included in the Proposal. If the DBE information is not submitted with the bid, the DBE Information form shall be removed from the documents prior to submitting the bid.

It is the bidder's responsibility to make enough work available to DBEs and to select those portions of the work or material needs consistent with the available DBEs to meet the goal for DBE participation or to provide information to establish that, prior to bidding, the bidder made adequate good faith efforts to do so.

If DBE information is not submitted with the bid, the apparent successful bidder (low bidder), the second low bidder and the third low bidder shall submit DBE information to the Department of Transportation, 1120 N Street, Room 0200, MS #26, Sacramento, California 95814 so the information is received by the Department no later than 4:00 p.m. on the fourth day, not including Saturdays, Sundays and legal holidays, following bid opening. DBE information sent by U.S. Postal Service certified mail with return receipt and certificate of mailing and mailed on or before the third day, not including Saturdays, Sundays and legal holidays, following bid opening will be accepted even if it is received after the fourth day following bid opening. Failure to submit the required DBE information by the time specified will be grounds for finding the bid or proposal nonresponsive. Other bidders need not submit DBE information unless requested to do so by the Department.

The bidder's DBE information shall establish that good faith efforts to meet the DBE goal have been made. To establish good faith efforts, the bidder shall demonstrate that the goal will be met or that, prior to bidding, adequate good faith efforts to meet the goal were made.

Bidders are cautioned that even though their submittal indicates they will meet the stated DBE goal, their submittal should also include their adequate good faith efforts information along with their DBE goal information to protect their eligibility for award of the contract in the event the Department, in its review, finds that the goal has not been met.

The bidder's DBE information shall include the names, addresses and phone numbers of DBE firms that will participate, with a complete description of work or supplies to be provided by each, the dollar value of each DBE transaction, and a written confirmation from the DBE that it is participating in the contract. A copy of the DBE's quote will serve as written confirmation that the DBE is participating in the contract. When 100 percent of a contract item of work is not to be performed or furnished by a DBE, a description of the exact portion of that work to be performed or furnished by that DBE shall be included in the DBE information, including the planned location of that work. The work that a DBE prime contractor has committed to performing with its own forces as well as the work that it has committed to be performed by DBE subcontractors, suppliers and trucking companies will count toward the goal.

The information necessary to establish the bidder's adequate good faith efforts to meet the DBE goal should include:

- A. The names and dates of each publication in which a request for DBE participation for this project was placed by the bidder.
- B. The names and dates of written notices sent to certified DBEs soliciting bids for this project and the dates and methods used for following up initial solicitations to determine with certainty whether the DBEs were interested.
- C. The items of work which the bidder made available to DBE firms, including, where appropriate, any breaking down of the contract work items (including those items normally performed by the bidder with its own forces) into economically feasible units to facilitate DBE participation. It is the bidder's responsibility to demonstrate that sufficient work to meet the DBE goal was made available to DBE firms.
- D. The names, addresses and phone numbers of rejected DBE firms, the firms selected for that work, and the reasons for the bidder's choice.
- E. Efforts made to assist interested DBEs in obtaining bonding, lines of credit or insurance, and any technical assistance or information related to the plans, specifications and requirements for the work which was provided to DBEs.
- F. Efforts made to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services, excluding supplies and equipment the DBE subcontractor purchases or leases from the prime contractor or its affiliate.
- G. The names of agencies contacted to provide assistance in contacting, recruiting and using DBE firms.
- H. Any additional data to support a demonstration of good faith efforts.

### **SECTION 3. AWARD AND EXECUTION OF CONTRACT**

The bidder's attention is directed to the provisions in Section 3, "Award and Execution of Contract," of the Standard Specifications and these special provisions for the requirements and conditions concerning award and execution of contract.

The award of the contract, if it be awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements prescribed and who has met the goal for DBE participation or has demonstrated, to the satisfaction of the Department, adequate good faith efforts to do so. Meeting the goal for DBE participation or demonstrating, to the satisfaction of the Department, adequate good faith efforts to do so is a condition for being eligible for award of contract.

A "Payee Data Record" form will be included in the contract documents to be executed by the successful bidder. The purpose of the form is to facilitate the collection of taxpayer identification data. The form shall be completed and returned to the Department by the successful bidder with the executed contract and contract bonds. For the purposes of the form, vendor shall be deemed to mean the successful bidder. The form is not to be completed for subcontractors or suppliers. Failure to complete and return the "Payee Data Record" form to the Department as provided herein will result in the retention of 31 percent of payments due the contractor and penalties of up to \$20,000. This retention of payments for failure to complete the "Payee Data Record" form is in addition to any other retention of payments due the Contractor.

### **SECTION 4. BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES**

Attention is directed to the provisions in Section 8-1.03, "Beginning of Work," in Section 8-1.06, "Time of Completion," and in Section 8-1.07, "Liquidated Damages," of the Standard Specifications and these special provisions.

The Contractor shall begin work within 15 calendar days after the contract has been approved by the Attorney General or the attorney appointed and authorized to represent the Department of Transportation.

This work shall be diligently prosecuted to completion before the expiration of **260 WORKING DAYS** beginning on the fifteenth calendar day after approval of the contract.

The Contractor shall pay to the State of California the sum of \$9,300 per day, for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed above.

### **SECTION 5. GENERAL**

#### **SECTION 5-1. MISCELLANEOUS**

##### **5-1.00 PLANS AND WORKING DRAWINGS**

When the specifications require working drawings to be submitted to the Division of Structure Design, the drawings shall be submitted to: Division of Structure Design, Documents Unit, Mail Station 9, 1801 30th Street, Sacramento, CA 95816, Telephone (916) 227-8252.

##### **5-1.003 LABORATORY**

Section 1-1.25, "Laboratory," of the Standard Specifications is amended to read:

**1-1.25 Laboratory.**—The Division of Materials Engineering and Testing Services and the Division of Structural Foundations of the Department of Transportation, or established laboratories of the various Districts of the Department, or other laboratories authorized by the Department to test materials and work involved in the contract. When a reference is made in the specifications to the "Transportation Laboratory," the reference shall mean the Division of Materials Engineering and Testing Services and the Division of Structural Foundations, located at 5900 Folsom Boulevard, Sacramento, CA 95819, Telephone (916) 227-7000.

#### **5-1.005 CONTRACT BONDS**

Attention is directed to Section 3-1.02, "Contract Bonds," of the Standard Specifications and these special provisions. The payment bond shall be in a sum not less than the following:

1. One hundred percent of the total amount payable by the terms of the contract when the total amount payable does not equal or exceed five million dollars (\$5,000,000).
2. Fifty percent of the total amount payable by the terms of the contract when the total amount payable is not less than five million dollars (\$5,000,000) and does not exceed ten million dollars (\$10,000,000).
3. Twenty-five percent of the total amount payable by the terms of the contract when the total amount payable exceeds ten million dollars (\$10,000,000).

#### **5-1.01 LABOR NONDISCRIMINATION**

Attention is directed to the following Notice that is required by Chapter 5 of Division 4 of Title 2, California Code of Regulations.

##### **NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM (GOV. CODE, SECTION 12990)**

Your attention is called to the "Nondiscrimination Clause", set forth in Section 7-1.01A(4), "Labor Nondiscrimination," of the Standard Specifications, which is applicable to all nonexempt state contracts and subcontracts, and to the "Standard California Nondiscrimination Construction Contract Specifications" set forth therein. The Specifications are applicable to all nonexempt state construction contracts and subcontracts of \$5000 or more.

#### **5-1.02 LABOR CODE REQUIREMENTS**

Section 7-1.01A(1), "Hours of Labor," of the Standard Specifications is amended to read:

**7-1.01A(1) Hours of Labor.**— Eight hours labor constitutes a legal day's work. The Contractor or any subcontractor under the Contractor shall forfeit, as a penalty to the State of California, \$25 for each worker employed in the execution of the contract by the respective Contractor or subcontractor for each calendar day during which that worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of the provisions of the Labor Code, and in particular, Section 1810 to Section 1815, thereof, inclusive, except that work performed by employees of Contractors in excess of 8 hours per day, and 40 hours during any one week, shall be permitted upon compensation for all hours worked in excess of 8 hours per day at not less than one and one-half times the basic rate of pay, as provided in Section 1815 thereof.

Section 7-1.01A(2), "Prevailing Wage," of the Standard Specifications is amended to read:

**7-1.01A(2) Prevailing Wage.**— The Contractor and any subcontractor under the Contractor shall comply with Labor Code Sections 1774 and 1775. Pursuant to Section 1775, the Contractor and any subcontractor under the Contractor shall forfeit to the State or political subdivision on whose behalf the contract is made or awarded a penalty of not more than fifty dollars (\$50) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates as determined by the Director of Industrial Relations for the work or craft in which the worker is employed for any public work done under the contract by the Contractor or by any subcontractor under the Contractor in violation of the provisions of the Labor Code and in particular, Labor Code Sections 1770 to 1780, inclusive. The amount of this forfeiture shall be determined by the Labor Commissioner and shall be based on consideration of the mistake, inadvertence, or neglect of the Contractor or subcontractor in failing to pay the correct rate of prevailing wages, or the previous record of the Contractor or subcontractor in meeting their respective prevailing wage obligations, or the willful failure by the Contractor or subcontractor to pay the correct rates of prevailing wages. A mistake, inadvertence, or neglect in failing to pay the correct rate of prevailing wages is not excusable if the Contractor or subcontractor had knowledge of the obligations under the Labor Code. In addition to the penalty and pursuant to Labor Code Section 1775, the difference between the prevailing wage rates and the amount paid to each worker for each calendar day or

portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by the Contractor or subcontractor. If a worker employed by a subcontractor on a public works project is not paid the general prevailing per diem wages by the subcontractor, the prime contractor of the project is not liable for the penalties described above unless the prime contractor had knowledge of that failure of the subcontractor to pay the specified prevailing rate of wages to those workers or unless the prime contractor fails to comply with all of the following requirements:

1. The contract executed between the contractor and the subcontractor for the performance of work on the public works project shall include a copy of the provisions of Sections 1771, 1775, 1776, 1777.5, 1813, and 1815 of the Labor Code.
2. The contractor shall monitor the payment of the specified general prevailing rate of per diem wages by the subcontractor to the employees, by periodic review of the certified payroll records of the subcontractor.
3. Upon becoming aware of the subcontractor's failure to pay the specified prevailing rate of wages to the subcontractor's workers, the contractor shall diligently take corrective action to halt or rectify the failure, including, but not limited to, retaining sufficient funds due the subcontractor for work performed on the public works project.
4. Prior to making final payment to the subcontractor for work performed on the public works project, the contractor shall obtain an affidavit signed under penalty of perjury from the subcontractor that the subcontractor has paid the specified general prevailing rate of per diem wages to the subcontractor's employees on the public works project and any amounts due pursuant to Section 1813 of the Labor Code.

Pursuant to Section 1775 of the Labor Code, the Division of Labor Standards Enforcement shall notify the Contractor on a public works project within 15 days of the receipt by the Division of Labor Standards Enforcement of a complaint of the failure of a subcontractor on that public works project to pay workers the general prevailing rate of per diem wages. If the Division of Labor Standards Enforcement determines that employees of a subcontractor were not paid the general prevailing rate of per diem wages and if the Department did not retain sufficient money under the contract to pay those employees the balance of wages owed under the general prevailing rate of per diem wages, the contractor shall withhold an amount of moneys due the subcontractor sufficient to pay those employees the general prevailing rate of per diem wages if requested by the Division of Labor Standards Enforcement. The Contractor shall pay any money retained from and owed to a subcontractor upon receipt of notification by the Division of Labor Standards Enforcement that the wage complaint has been resolved. If notice of the resolution of the wage complaint has not been received by the Contractor within 180 days of the filing of a valid notice of completion or acceptance of the public works project, whichever occurs later, the Contractor shall pay all moneys retained from the subcontractor to the Department. These moneys shall be retained by the Department pending the final decision of an enforcement action.

Pursuant to the provisions of Section 1773 of the Labor Code, the Department has obtained the general prevailing rate of wages (which rate includes employer payments for health and welfare, pension, vacation, travel time, and subsistence pay as provided for in Section 1773.8 of the Labor Code, apprenticeship or other training programs authorized by Section 3093 of the Labor Code, and similar purposes) applicable to the work to be done, for straight time, overtime, Saturday, Sunday and holiday work. The holiday wage rate listed shall be applicable to all holidays recognized in the collective bargaining agreement of the particular craft, classification or type of workmen concerned. The general prevailing wage rates and any applicable changes to these wage rates are available at the Labor Compliance Office at the offices of the District Director of Transportation for the district in which the work is situated. For work situated in District 9, the wage rates are available at the Labor Compliance Office at the offices of the District Director of Transportation for District 6, located at Fresno. General prevailing wage rates are also available from the California Department of Industrial Relations' Internet Web Site at: <http://www.dir.ca.gov>.

The wage rates determined by the Director of Industrial Relations for the project refer to expiration dates. Prevailing wage determinations with a single asterisk after the expiration date are in effect on the date of advertisement for bids and are good for the life of the contract. Prevailing wage determinations with double asterisks after the expiration date indicate that the wage rate to be paid for work performed after this date has been determined. If work is to extend past this date, the new rate shall be paid and incorporated in the contract. The Contractor shall contact the Department of Industrial Relations as indicated in the wage rate determinations to obtain predetermined wage changes.

Pursuant to Section 1773.2 of the Labor Code, general prevailing wage rates shall be posted by the Contractor at a prominent place at the site of the work.

Changes in general prevailing wage determinations which conform to Labor Code Section 1773.6 and Title 8 California Code of Regulations Section 16204 shall apply to the project when issued by the Director of Industrial Relations at least 10 days prior to the date of the Notice to Contractors for the project.

The State will not recognize any claim for additional compensation because of the payment by the Contractor of any wage rate in excess of the prevailing wage rate set forth in the contract. The possibility of wage increases is one of the

elements to be considered by the Contractor in determining the bid, and will not under any circumstances be considered as the basis of a claim against the State on the contract.

**7-1.01A(2)(a) Travel and Subsistence Payments.**— Attention is directed to the requirements of Section 1773.8 of the Labor Code. The Contractor shall make travel and subsistence payments to each workman, needed to execute the work, in accordance with the requirements in Labor Code Section 1773.8.

The first and second paragraphs of Section 7-1.01A(3), "Payroll Records," of the Standard Specifications are amended to read:

**7-1.01A(3) Payroll Records.**— Attention is directed to the provisions of Labor Code Section 1776, a portion of which is quoted below. Regulations implementing Labor Code Section 1776 are located in Sections 16016 through 16019 and Sections 16207.10 through 16207.19 of Title 8, California Code of Regulations.

"1776. (a) Each contractor and subcontractor shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

(1) The information contained in the payroll record is true and correct.

(2) The employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by his or her employees on the public works project.

"(b) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the contractor on the following basis:

(1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request.

(2) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to a representative of the body awarding the contract, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations.

(3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request by the public for inspection or for copies thereof. However, a request by the public shall be made through either the body awarding the contract, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to paragraph (2), the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the contractor.

"(c) The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division.

"(d) A contractor or subcontractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested the records within 10 days after receipt of a written request.

"(e) Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated in a manner so as to prevent disclosure of an individual's name, address, and social security number. The name and address of the contractor awarded the contract or the subcontractor performing the contract shall not be marked or obliterated.

"(f) The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city and county, and shall, within five working days, provide a notice of a change of location and address.

"(g) The contractor or subcontractor shall have 10 days in which to comply subsequent to receipt of a written notice requesting the records enumerated in subdivision (a). In the event that the contractor or subcontractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit twenty-five dollars (\$25) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. A contractor is not subject to a penalty assessment pursuant to this section due to the failure of a subcontractor to comply with this section."

The penalties specified in subdivision (g) of Labor Code Section 1776 for noncompliance with the provisions of Section 1776 may be deducted from any moneys due or which may become due to the Contractor.

Contract No. «Dist»-«Contract\_No»

## **5-1.023 INDEMNIFICATION AND INSURANCE**

Section 7-1.12, "Responsibility for Damage," of the Standard Specifications is deleted. All references to Section 7-1.12 in the Contract documents shall be deemed to mean Sections 7-1.121, "Indemnification," and 7-1.122, "Insurance," as added below.

The Standard Specifications is amended by adding the following Section 7-1.121, "Indemnification," and Section 7-1.122, "Insurance," before Section 7-1.125, "Legal Action Against the Department":

**7-1.121 Indemnification.**—With the exception that this section shall in no event be construed to require indemnification by the Contractor to a greater extent than permitted by law, the Contractor shall defend, indemnify and save harmless the State, including its officers, directors, agents (excluding agents who are design professionals), and employees, and each of them (Indemnitees), from any and all claims, demands, causes of action, damages, costs, expenses, actual attorneys' fees, losses or liabilities, in law or in equity, of every kind and nature whatsoever (Claims), arising out of or in connection with the Contractor's performance of this contract for:

- A. Bodily injury including, but not limited to, bodily injury, sickness or disease, emotional injury or death to persons, including, but not limited to, the public, any employees or agents of the Contractor, State, Department, or any other contractor and;
- B. Damage to property of anyone including loss of use thereof;

caused or alleged to be caused in whole or in part by any negligent or otherwise legally actionable act or omission of the Contractor or anyone directly or indirectly employed by the Contractor or anyone for whose acts the Contractor may be liable.

Except as otherwise provided by law, the indemnification provisions above shall apply regardless of the existence or degree of fault of Indemnitees. The Contractor, however, shall not be obligated to indemnify Indemnitees for Claims arising from conduct delineated in Civil Code section 2782. Further, the Contractor's indemnity obligation shall not extend to Claims to the extent they arise from any defective or substandard condition of the roadway which existed at or prior to the time the Contractor commenced work, unless this condition has been changed by the work or the scope of the work requires the Contractor to maintain existing Roadway facilities and the claim arises from the Contractor's failure to maintain. The Contractor's indemnity obligation shall extend to Claims arising after the work is completed and accepted only if these Claims are directly related to alleged acts or omissions of the Contractor which occurred during the course of the work. No inspection by the Department, its employees or agents shall be deemed a waiver by the Department of full compliance with the requirements of this section.

The Contractor's obligation to defend and indemnify shall not be excused because of the Contractor's inability to evaluate liability or because the Contractor evaluates liability and determines that the Contractor is not liable to the claimant. The Contractor will respond within 30 days to the tender of any claim for defense and indemnity by the State, unless this time has been extended by the State. If the Contractor fails to accept or reject a tender of defense and indemnity within 30 days, in addition to any other remedy authorized by law, so much of the money due the Contractor under and by virtue of the contract as shall reasonably be considered necessary by the Department, may be retained by the State until disposition has been made of the claim or suit for damages, or until the Contractor accepts or rejects the tender of defense, whichever occurs first.

With respect to third party claims against the Contractor, the Contractor waives any and all rights of any type to express or implied indemnity against the State, its directors, officers, employees, or agents (excluding agents who are design professionals).

**7-1.122 Insurance.**—Insurance shall conform to the following requirements:

**7-1.122A Casualty Insurance.**—The Contractor shall, at the Contractor's expense, procure and maintain insurance on all of its operations with companies acceptable to the Department as follows. All insurance shall be kept in full force and effect from the beginning of the work through final acceptance by the State. In addition, the Contractor shall maintain completed operations coverage with a carrier acceptable to the Department through the expiration of the patent deficiency in construction statute of repose set forth in Section 337.1 of the Code of Civil Procedure.

**7-1.122A(1) Workers' Compensation and Employer's Liability Insurance.**—Workers' Compensation insurance shall be provided as specified in Section 7-1.01A(6), "Workers' Compensation." Employer's Liability Insurance shall be provided in amounts not less than:

- (a) \$1 000 000 for each accident for bodily injury by accident.
- (b) \$1 000 000 policy limit for bodily injury by disease.
- (c) \$1 000 000 for each employee for bodily injury by disease.

If there is an exposure of injury to the Contractors' employees under the U.S. Longshoremen's and Harbor Workers' Compensation Act, the Jones Act or under laws, regulations or statutes applicable to maritime employees, coverage shall be included for such injuries or claims.

**7-1.122A(2) Liability Insurance.**—The Contractor shall carry General Liability and Umbrella or Excess Liability Insurance covering all operations by or on behalf of the Contractor providing insurance for bodily injury liability, and property damage liability for the limits of liability indicated below and including coverage for:

- (a) premises, operations and mobile equipment
- (b) products and completed operations
- (c) broad form property damage (including completed operations)
- (d) explosion, collapse and underground hazards
- (e) personal injury
- (f) contractual liability

**7-1.122A(3) Liability Limits/Additional Insureds.**—The limits of liability shall be at least:

- (a) \$1 000 000 for each occurrence (combined single limit for bodily injury and property damage).
- (b) \$2 000 000 aggregate for products-completed operations.
- (c) \$2 000 000 general aggregate. This general aggregate limit shall apply separately to the Contractor's work under this Agreement.
- (d) \$5 000 000 umbrella or excess liability. For projects over \$25 000 000 only, an additional \$10 000 000 umbrella or excess liability (for a total of \$15 000 000). Umbrella or excess policy shall include products liability completed operations coverage and may be subject to \$5 000 000 or \$15 000 000 aggregate limits. Further, the umbrella or excess policy shall contain a clause stating that it takes effect (drops down) in the event the primary limits are impaired or exhausted.

The State and the Department, including their officers, directors, agents (excluding agents who are design professionals), and State employees, shall be named as additional insureds under the General Liability and Umbrella Liability Policies with respect to liability arising out of or connected with work or operations performed by or on behalf of the Contractor under this contract. Coverage for such additional insureds shall not extend to liability:

- (1) arising from any defective or substandard condition of the Roadway which existed at or prior to the time the Contractor commenced work, unless such condition has been changed by the work or the scope of the work requires the Contractor to maintain existing Roadway facilities and the claim arises from the Contractor's failure to maintain; or
- (2) for claims occurring after the work is completed and accepted unless these claims are directly related to alleged acts or omissions of the Contractor which occurred during the course of the work; or
- (3) to the extent prohibited by Section 11580.04 of the Insurance Code.

The policy shall stipulate that the insurance afforded the additional insureds shall apply as primary insurance. Any other insurance or self insurance maintained by the Department or State will be excess only and shall not be called upon to contribute with this insurance. Such additional insured coverage shall be provided by a policy provision or by an endorsement providing coverage at least as broad as Additional Insured (Form B) endorsement form CG 1010, as published by the Insurance Services Office (ISO).

**7-1.122B Automobile Liability Insurance.**—The Contractor shall carry automobile liability insurance, including coverage for all owned, hired and non-owned automobiles. The primary limits of liability shall be not less than \$1 000 000 combined single limit each accident for bodily injury and property damage. The umbrella or excess liability coverage required under Section 7-1.122A(3), "Liability Limits/Additional Insureds," shall also apply to automobile liability.

**7-1.122C Policy Forms, Endorsements and Certificates.**—The Contractor's General Liability Insurance shall be provided under Commercial General Liability policy form no. CG0001 as published by the Insurance Services Office (ISO) or under a policy form at least as broad as policy form no. CG0001.

Evidence of insurance in a form acceptable to the Department, including the required "additional insured" endorsements, shall be furnished by the Contractor to the Department at or prior to the pre-construction conference. The evidence of insurance shall provide that there will be no cancellation, lapse, or reduction of coverage without thirty (30) days' prior written notice to the Department. Certificates of Insurance, as evidence of required insurance, for the General Liability, Auto Liability and Umbrella-Excess Liability policies shall set forth deductible amounts applicable to each policy and all exclusions which are added by endorsement to each policy. The Department may expressly allow deductible clauses, which it does not consider excessive, overly broad, or harmful to the interests of the State. Standard ISO form CG 0001 or similar exclusions will be allowed provided they are not inconsistent with the requirements of this section. Allowance of any additional exclusions is at the discretion of the Department. Regardless of the allowance of exclusions or deductions by the Department, the Contractor shall be responsible for any deductible amount and shall warrant that the coverage provided to the Department is consistent with the requirements of this section.

**7-1.122D Enforcement.**—The Department may take any steps as are necessary to assure Contractor's compliance with its obligations. Should any insurance policy lapse or be canceled during the contract period the Contractor shall, within thirty (30) days prior to the effective expiration or cancellation date, furnish the Department with evidence of renewal or replacement of the policy. Failure to continuously maintain insurance coverage as herein provided is a material breach of contract. In the event the Contractor fails to maintain any insurance coverage required, the Department may, but is not required to, maintain this coverage and charge the expense to the Contractor or terminate this Agreement. The required insurance shall be subject to the approval of Department, but any acceptance of insurance certificates by the Department shall in no way limit or relieve the Contractor of the Contractor's duties and responsibilities under the Contract to indemnify, defend and hold harmless the State, its officers, agents, and employees. Insurance coverage in the minimum amounts set forth herein shall not be construed to relieve the Contractor for liability in excess of such coverage, nor shall it preclude the State from taking other actions as is available to it under any other provision of the contract or law. Failure of the Department to enforce in a timely manner any of the provisions of this section shall not act as a waiver to enforcement of any of these provisions at a later date.

**7-1.122E Self-Insurance.**—Self-insurance programs and self-insured retentions in insurance policies are subject to separate annual review and approval by the State of evidence of the Contractor's financial capacity to respond. Additionally, self-insurance programs or retentions must provide the State with at least the same protection from liability and defense of suits as would be afforded by first-dollar insurance.

**7-1.122F Miscellaneous.**—Nothing contained in the Contract is intended to make the public or any member thereof a third party beneficiary of the Insurance or Indemnity provisions of these Standard Specifications, nor is any term, condition or other provision of the Contract intended to establish a standard of care owed to the public or any member thereof.

## **5-1.025 ARBITRATION**

The last paragraph in Section 9-1.10, "Arbitration," of the Standard Specifications, is amended to read:

Arbitration shall be initiated by a Complaint in Arbitration made in compliance with the requirements of those regulations. A Complaint in Arbitration by the Contractor shall be made not later than 90 days after the date of service in person or by mail on the Contractor of the final written decision by the Department on the claim.

## **5-1.03 PAYMENT OF WITHHELD FUNDS**

Section 9-1.065, "Payment of Withheld Funds," of the Standard Specifications, is amended by adding the following after the third paragraph:

Alternatively, and subject to the approval of the Department, the payment of retentions earned may be deposited directly with a person licensed under Division 6 (commencing with Section 17000) of the Financial Code as the escrow agent. Upon written request of an escrow agent that has not been approved by the Department under subdivision (c) of Section 10263 of the Public Contract Code, the Department will provide written notice to that escrow agent within 10 business days of receipt of the request indicating the reason or reasons for not approving that escrow agent. The payments will be deposited in a trust account with a Federally chartered bank or savings association within 24 hours of receipt by the escrow agent. The Contractor shall not place any retentions with the escrow agent in excess of the coverage provided to that escrow agent pursuant to subdivision (b) of Section 17314 of the Financial Code. In all



respects not inconsistent with subdivision (c) of Section 10263 of the Public Contract Code, the remaining provisions of Section 10263 of the Public Contract Code shall apply to escrow agents acting pursuant to subdivision (c) of Section 10263 of the Public Contract Code.

#### **5-1.04 INTEREST ON PAYMENTS**

Interest shall be payable on progress payments, payments after acceptance, final payments, extra work payments and claim payments as follows:

1. Unpaid progress payments, payment after acceptance and final payments shall begin to accrue interest 30 days after the Engineer prepares the payment estimate.
2. Unpaid extra work bills shall begin to accrue interest 30 days after preparation of the first pay estimate following the receipt of a properly submitted and undisputed extra work bill. To be properly submitted, the bill must be submitted within 7 days of the performance of the extra work and in accordance with the requirements of Section 9-1.03C, "Records," and Section 9-1.06, "Partial Payments," of the Standard Specifications. An undisputed extra work bill not submitted within 7 days of performance of the extra work will begin to accrue interest 30 days after the preparation of the second pay estimate following submittal of the bill.
3. The rate of interest payable for unpaid progress payments, payments after acceptance, final payments and extra work payments shall be 10 percent per annum.
4. The rate of interest payable on a claim, protest or dispute ultimately allowed under this contract shall be 6 percent per annum. Interest shall begin to accrue 61 days after the Contractor submits to the Engineer information in sufficient detail to enable the Engineer to ascertain the basis and amount of said claim, protest or dispute.

The rate of interest payable on any award in arbitration shall be 6 percent per annum if allowed under the provisions of Civil Code Section 3289.

#### **5-1.05 PUBLIC SAFETY**

The Contractor shall provide for the safety of traffic and the public in conformance with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications and these special provisions.

The Contractor shall install temporary railing (Type K) between a lane open to public traffic and an excavation, obstacle, or storage area when the following conditions exist:

- (1) Excavations.—The near edge of the excavation is 3.6 m or less from the edge of the lane, except:
  - (a) Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.
  - (b) Excavations less than 0.3-m deep.
  - (c) Trenches less than 0.3-m wide for irrigation pipe or electrical conduit, or excavations less than 0.3-m in diameter.
  - (d) Excavations parallel to the lane for the purpose of pavement widening or reconstruction.
  - (e) Excavations in side slopes, where the slope is steeper than 1:4 (vertical:horizontal).
  - (f) Excavations protected by existing barrier or railing.
- (2) Temporarily Unprotected Permanent Obstacles.—The work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or the Contractor, for the Contractor's convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.
- (3) Storage Areas.—Material or equipment is stored within 3.6 m of the lane and the storage is not otherwise prohibited by the provisions of the Standard Specifications and these special provisions.

The approach end of temporary railing (Type K), installed in conformance with the provisions in this section "Public Safety" and in Section 7-1.09, "Public Safety," of the Standard Specifications, shall be offset a minimum of 4.6 m from the edge of the traffic lane open to public traffic. The temporary railing shall be installed on a skew toward the edge of the traffic lane of not more than 0.3-m transversely to 3 m longitudinally with respect to the edge of the traffic lane. If the 4.6-m minimum offset cannot be achieved, the temporary railing shall be installed on the 10 to 1 skew to obtain the maximum available offset between the approach end of the railing and the edge of the traffic lane, and an array of temporary crash cushion modules shall be installed at the approach end of the temporary railing.

Temporary railing (Type K) shall conform to the provisions in Section 12-3.08, "Temporary Railing (Type K)," of the Standard Specifications. Temporary railing (Type K), conforming to the details shown on 1995 Standard Plan T3 or 1992 Standard Plan T3, may be used. Temporary railing (Type K) fabricated prior to January 1, 1993, and conforming to 1988 Standard Plan B11-30 may be used, provided the fabrication date is printed on the required Certificate of Compliance.

The fourteenth paragraph of Section 12-3.08, "Temporary Railing (Type K)," of the Standard Specifications is amended to read:

Each rail unit placed within 3 m of a traffic lane shall have a reflector installed on top of the rail as directed by the Engineer. A Type P marker panel shall also be installed at each end of railing installed adjacent to a two-lane, two-way highway and at the end facing traffic of railing installed adjacent to a one-way roadbed. If the railing is placed on a skew, the marker shall be installed at the end of the skew nearest the traveled way. Type P marker panels shall conform to the provisions in Section 82, "Markers and Delineators," except that the Contractor shall furnish the marker panels.

Reflectors on temporary railing (Type K) shall conform to the provisions in "Approved Traffic Products" of these special provisions.

Temporary crash cushion modules shall conform to the provisions in "Temporary Crash Cushion Module" of these special provisions.

Except for installing, maintaining and removing traffic control devices, whenever work is performed or equipment is operated in the following work areas the Contractor shall close the adjacent traffic lane unless otherwise provided in the Standard Specifications and these special provisions:

Approach speed of public traffic (Posted Limit) (Kilometers Per Hour)	Work Areas
Over 72 (45 Miles Per Hour)	Within 1.8 m of a traffic lane but not on a traffic lane
56 to 72 (35 to 45 Miles Per Hour)	Within 0.9-m of a traffic lane but not on a traffic lane

The lane closure provisions of this section shall not apply if the work area is protected by permanent or temporary railing or barrier.

When traffic cones or delineators are used to delineate a temporary edge of traffic lane, the line of cones or delineators shall be considered to be the edge of traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 3 m without written approval from the Engineer.

When work is not in progress on a trench or other excavation that required closure of an adjacent lane, the traffic cones or portable delineators used for the lane closure shall be placed off of and adjacent to the edge of the traveled way. The spacing of the cones or delineators shall be not more than the spacing used for the lane closure.

Suspended loads or equipment shall not be moved nor positioned over public traffic or pedestrians.

Full compensation for conforming to the provisions in this section "Public Safety," including furnishing and installing temporary railing (Type K) and temporary crash cushion modules, shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed therefor.

#### **5-1.06 SURFACE MINING AND RECLAMATION ACT**

Attention is directed to the Surface Mining and Reclamation Act of 1975, commencing in Public Resources Code, Mining and Geology, Section 2710, which establishes regulations pertinent to surface mining operations.

Material from mining operations furnished for this project shall only come from permitted sites in compliance with the Surface Mining and Reclamation Act of 1975.

The requirements of this section shall apply to all materials furnished for the project, except for acquisition of materials in conformance with Section 4-1.05, "Use of Materials Found on the Work," of the Standard Specifications.

#### **5-1.07 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES**

When the presence of asbestos or hazardous substances are not shown on the plans or indicated in the specifications and the Contractor encounters materials which the Contractor reasonably believes to be asbestos or a hazardous substance as defined in Section 25914.1 of the Health and Safety Code, and the asbestos or hazardous substance has not been rendered harmless, the Contractor may continue work in unaffected areas reasonably believed to be safe, and shall immediately cease work in the affected area and report the condition to the Engineer in writing.

In accordance with Section 25914.1 of the Health and Safety Code, all such removal of asbestos or hazardous substances including any exploratory work to identify and determine the extent of the asbestos or hazardous substance will be performed by separate contract.

If delay of work in the area delays the current controlling operation, the delay will be considered a right of way delay and the Contractor will be compensated for the delay as provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

#### **5-1.08 YEAR 2000 COMPLIANCE**

This contract is subject to Year 2000 Compliance for automated devices in the State of California. Year 2000 compliance is defined as follows:

Year 2000 compliance for automated devices in the State of California is achieved when embedded functions have or create no logical or mathematical inconsistencies when dealing with dates prior to and beyond 1999. The year 2000 is recognized and processed as a leap year. The product must also operate accurately in the manner in which it was intended for date operation without requiring manual intervention.

The Contractor shall provide the Engineer a Certificate of Compliance from the manufacturer in accordance with the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for all automated devices furnished for the project.

#### **5-1.085 BUY AMERICA REQUIREMENTS**

Attention is directed to the "Buy America" requirements of the Surface Transportation Assistance Act of 1982 (Section 165) and the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) Sections 1041(a) and 1048(a), and the regulations adopted pursuant thereto. In accordance with the law and regulations, all manufacturing processes for steel and iron materials furnished for incorporation into the work on this project shall occur in the United States; with the exception that pig iron and processed, pelletized and reduced iron ore manufactured outside of the United States may be used in the domestic manufacturing process for such steel and iron materials. The application of coatings, such as epoxy coating, galvanizing, painting and any other coating that protects or enhances the value of steel or iron materials shall be considered a manufacturing process subject to the "Buy America" requirements.

A Certificate of Compliance, conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, shall be furnished for steel and iron materials. The certificates, in addition to certifying that the materials comply with the specifications, shall also specifically certify that all manufacturing processes for the materials occurred in the United States, except for the above exceptions.

The requirements imposed by the law and regulations do not prevent a minimal use of foreign steel and iron materials if the total combined cost of the materials used does not exceed one-tenth of one percent (0.1%) of the total contract cost or \$2500, whichever is greater. The Contractor shall furnish the Engineer acceptable documentation of the quantity and value of any foreign steel and iron prior to incorporating the materials into the work.

#### **5-1.09 SUBCONTRACTOR AND DBE RECORDS**

The Contractor shall maintain records showing the name and business address of each first-tier subcontractor. The records shall also show the name and business address of every DBE subcontractor, DBE vendor of materials and DBE trucking company, regardless of tier. The records shall show the date of payment and the total dollar figure paid to all of these firms. DBE prime contractors shall also show the date of work performed by their own forces along with the corresponding dollar value of the work.

Upon completion of the contract, a summary of these records shall be prepared on Form CEM-2402 (F) and certified correct by the Contractor or the Contractor's authorized representative, and shall be furnished to the Engineer. The form shall be furnished to the Engineer within 90 days from the date of contract acceptance. \$10,000 will be withheld from payment until the Form CEM-2402 (F) is submitted. The amount will be returned to the Contractor when a satisfactory Form CEM-2402 (F) is submitted.

Prior to the fifteenth of each month, the Contractor shall submit documentation to the Engineer showing the amount paid to DBE trucking companies listed in the Contractor's DBE information. This monthly documentation shall indicate the portion of the revenue paid to DBE trucking companies which is claimed toward DBE participation. The Contractor shall also obtain and submit documentation to the Engineer showing the amount paid by DBE trucking companies to all firms, including owner-operators, for the leasing of trucks. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The records must confirm that the amount of credit claimed toward DBE participation conforms with Section 2-1.02, "Disadvantaged Business Enterprise," of these special provisions.

The Contractor shall also obtain and submit documentation to the Engineer showing the truck number, owner's name, California Highway Patrol CA number, and if applicable, the DBE certification number of the owner of the truck for all trucks used during that month for which DBE participation will be claimed. This documentation shall be submitted on Form CEM-2404 (F).

### **5-1.093 DBE CERTIFICATION STATUS**

If a DBE subcontractor is decertified during the life of the project, the decertified subcontractor shall notify the Contractor in writing with the date of decertification. If a subcontractor becomes a certified DBE during the life of the project, the subcontractor shall notify the Contractor in writing with the date of certification. The Contractor shall furnish the written documentation to the Engineer.

Upon completion of the contract, Form CEM-2403 (F) indicating the DBE's existing certification status shall be signed and certified correct by the Contractor. The certified form shall be furnished to the Engineer within 90 days from the date of contract acceptance.

### **5-1.095 PERFORMANCE OF DBE SUBCONTRACTORS AND SUPPLIERS**

The DBEs listed by the Contractor in response to the provisions in Section 2-1.02B, "Submission of DBE Information," and Section 3, "Award and Execution of Contract," of these special provisions, which are determined by the Department to be certified DBEs, shall perform the work and supply the materials for which they are listed, unless the Contractor has received prior written authorization to perform the work with other forces or to obtain the materials from other sources.

Authorization to use other forces or sources of materials may be requested for the following reasons:

- A. The listed DBE, after having had a reasonable opportunity to do so, fails or refuses to execute a written contract, when such written contract, based upon the general terms, conditions, plans and specifications for the project, or on the terms of such subcontractor's or supplier's written bid, is presented by the Contractor.
- B. The listed DBE becomes bankrupt or insolvent.
- C. The listed DBE fails or refuses to perform the subcontract or furnish the listed materials.
- D. The Contractor stipulated that a bond was a condition of executing a subcontract and the listed DBE subcontractor fails or refuses to meet the bond requirements of the Contractor.
- E. The work performed by the listed subcontractor is substantially unsatisfactory and is not in substantial conformance with the plans and specifications, or the subcontractor is substantially delaying or disrupting the progress of the work.
- F. It would be in the best interest of the State.

The Contractor shall not be entitled to any payment for such work or material unless it is performed or supplied by the listed DBE or by other forces (including those of the Contractor) pursuant to prior written authorization of the Engineer.

### **5-1.097 SUBCONTRACTING**

Attention is directed to the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, and Section 2, "Proposal Requirements and Conditions," and Section 3, "Award and Execution of Contract," of these special provisions.

Section 8-1.01 of the Standard Specifications is amended by adding the following before the sixth paragraph:

Pursuant to the provisions of Section 6109 of the Public Contract Code, the Contractor shall not perform work on a public works project with a subcontractor who is ineligible to perform work on the public works project pursuant to Section 1777.1 or 1777.7 of the Labor Code.

Pursuant to the provisions of Section 1777.1 of the Labor Code, the Labor Commissioner publishes and distributes a list of contractors ineligible to perform work as a subcontractor on a public works project. This list of debarred contractors is available from the Department of Industrial Relations web site at:

[http://www.dir.ca.gov/dir/Labor\\_law/DLSE/Debar.html](http://www.dir.ca.gov/dir/Labor_law/DLSE/Debar.html).

The provisions in the third paragraph of Section 8-1.01, "Subcontracting," of the Standard Specifications, that the Contractor shall perform with the Contractor's own organization contract work amounting to not less than 50 percent of the original contract price, is not changed by the Federal Aid requirement specified under "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions that the Contractor perform not less than 30 percent of the original contract work with the Contractor's own organization.

Each subcontract and any lower tier subcontract that may in turn be made shall include the "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions. This requirement shall be enforced as follows:

- A. Noncompliance shall be corrected. Payment for subcontracted work involved will be withheld from progress payments due, or to become due, until correction is made. Failure to comply may result in termination of the contract.

The DBE information furnished under Section 2-1.02B, "Submission of DBE Information," of these special provisions is in addition to the subcontractor information required to be furnished under Section 8-1.01, "Subcontracting," and Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications.

In conformance with the Federal DBE regulations Sections 26.53(f)(1) and 26.53(f)(2) Part 26, Title 49 CFR:

- A. The Contractor shall not terminate for convenience a DBE subcontractor listed in response to Section 2-1.02B, "Submission of DBE Information," and then perform that work with its own forces, or those of an affiliate without the written consent of the Department, and
- B. If a DBE subcontractor is terminated or fails to complete its work for any reason, the Contractor will be required to make good faith efforts to substitute another DBE subcontractor for the original DBE subcontractor, to the extent needed to meet the contract goal.

The requirement in Section 2-1.02, "Disadvantaged Business Enterprise (DBE)," of these special provisions that DBEs must be certified on the date bids are opened does not apply to DBE substitutions after award of the contract.

#### **5-1.098 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS**

Attention is directed to the provisions in Sections 10262 and 10262.5 of the Public Contract Code and Section 7108.5 of the Business and Professions Code concerning prompt payment to subcontractors.

#### **5-1.099 PROMPT PAYMENT OF WITHHELD FUNDS TO SUBCONTRACTORS**

The Contractor shall return all moneys withheld in retention from the subcontractor within 30 days after receiving payment for work satisfactorily completed, even if the other contract work is not completed and has not been accepted in conformance with Section 7-1.17, "Acceptance of Contract," of the Standard Specifications. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the Contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the Contractor or deficient subcontract performance or noncompliance by a subcontractor.

#### **5-1.10 PARTNERING**

The State will promote the formation of a "Partnering" relationship with the Contractor in order to effectively complete the contract to the benefit of both parties. The purpose of this relationship will be to maintain cooperative communication and mutually resolve conflicts at the lowest possible management level.

The Contractor may request the formation of such a "Partnering" relationship by submitting a request in writing to the Engineer after approval of the contract. If the Contractor's request for "Partnering" is approved by the Engineer, scheduling of a "Partnering" workshop, selecting the "Partnering" facilitator and workshop site, and other administrative details shall be as agreed to by both parties.

The costs involved in providing a facilitator and a workshop site will be borne equally by the State and the Contractor. The Contractor shall pay all compensation for the wages and expenses of the facilitator, and of the expenses for obtaining the workshop site. The State's share of such costs will be reimbursed to the Contractor in a change order written by the Engineer. Markups will not be added. All other costs associated with the "Partnering" relationship will be borne separately by the party incurring the costs.

The establishment of a "Partnering" relationship will not change or modify the terms and conditions of the contract and will not relieve either party of the legal requirements of the contract.

#### **5-1.11 FORCE ACCOUNT PAYMENT**

The second, third and fourth paragraphs of Section 9-1.03A, "Work Performed by Contractor," in the Standard Specifications, shall not apply.

To the total of the direct costs computed as provided in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental," of the Standard Specifications, there will be added a markup of 28 percent to the cost of labor, 10 percent to the cost of materials, and 10 percent to the equipment rental. These markups shall be applied to all force account work, regardless if the added force account work affects the contract completion date.

The above markups, together with payments made for time related overhead pursuant to "Overhead" of these special provisions, shall constitute full compensation for all overhead costs for work performed on a force account basis. These overhead costs shall be deemed to include all items of expense not specifically designated as cost or equipment rental in accordance with the provisions in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment

Rental," of the Standard Specifications. The total payment made as provided above and in the first paragraph of Section 9-1.03A, "Work Performed by Contractor," shall be deemed to be the actual cost of the work performed on a force account basis, and shall constitute full compensation therefor.

When extra work to be paid for on a force account basis is performed by a subcontractor, approved in accordance with the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, an additional markup of 7 percent will be added to the total cost of that extra work including all markups specified in this section "Force Account Payment". The additional 7 percent markup shall reimburse the Contractor for additional administrative costs, and no other additional payment will be made by reason of performance of the extra work by a subcontractor.

#### **5-1.12 DISPUTES REVIEW BOARD**

To assist in the resolution of disputes or potential claims arising out of the work of this project, a Disputes Review Board, hereinafter referred to as the "DRB", shall be established by the Engineer and Contractor cooperatively upon approval of the contract. The DRB is intended to assist the contract administrative claims resolution process as set forth in the provisions of Section 9-1.04, "Notice of Potential Claim," and Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications. The DRB shall not be considered to serve as a substitute for any requirements in the specifications in regard to filing of potential claims. The requirements and procedures established in this special provision shall be considered as an essential prerequisite to filing a claim, for arbitration or for litigation prior or subsequent to project completion.

The DRB shall be utilized when dispute or potential claim resolution at the job level is unsuccessful. The DRB shall function until the day of acceptance of the contract, at which time the work of the DRB will cease except for completion of unfinished dispute hearings and reports. After acceptance of the contract any disputes or potential claims that the Contractor wants to pursue that have not been settled, shall be stated or restated, by the Contractor, in response to the Proposed Final Estimate within the time limits provided in Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications. The State will review those claims in accordance with Section 9-1.07B, of the Standard Specifications. Following the completion of the State's administrative claims procedure, the Contractor may resort to arbitration as provided in Section 9-1.10, "Arbitration," of the Standard Specifications.

Disputes, as used in this section, shall include all differences of opinion, properly noticed as provided hereinafter, between the State and Contractor on matters related to the work and other subjects considered by the State or Contractor, or by both, to be of concern to the DRB on this project, except matters relating to Contractor, subcontractor or supplier claims not actionable against the State as specified in these special provisions. Whenever the term "dispute" or "disputes" is used herein, it shall be deemed to include potential claims as well as disputes.

The DRB shall serve as an advisory body to assist in the resolution of disputes between the State and the Contractor, hereinafter referred to as the "parties". The DRB shall consider disputes referred to it, and furnish written reports containing findings and recommendations pertaining to those disputes, to the parties to aid in resolution of the differences between them. DRB findings and recommendations are not binding on the parties.

The DRB shall consist of one member selected by the State, one member selected by the Contractor, and a third member selected by the first two members and approved by both the State and the Contractor. The third member shall act as DRB Chairperson.

The first two DRB members shall select a third DRB member subject to the mutual approval of the parties, or may mutually concur on a list of potentially acceptable third DRB members and submit the list to the parties for final selection and approval of the third member. The goal in selection of the third member is to complement the professional experience of the first two members, and to provide leadership for the DRB's activities.

No DRB member shall have prior direct involvement in this contract, and no member shall have a financial interest in this contract or the parties thereto, within a period of 6 months prior to award of this contract, or during the contract, except as follows:

1. Compensation for services on this DRB.
2. Ownership interest in a party or parties, documented by the prospective DRB member, that has been reviewed and determined in writing by the State to be sufficiently insignificant to render the prospective member acceptable to the State.
3. Service as a member of other Disputes Review Boards on other contracts.
4. Retirement payments or pensions received from a party that are not tied to, dependent on or affected by the net worth of the party.
5. The above provisions apply to any party having a financial interest in this contract; including but not limited to contractors, subcontractors, suppliers, consultants, and legal and business services.

DRB members shall be especially knowledgeable in the type of construction and contract documents potentially anticipated by the contract, and shall discharge their responsibilities impartially and as an independent body considering the

facts and circumstances related to the matters under consideration, applicable laws and regulations, and the pertinent provisions of the contract.

The State and the Contractor shall select their respective DRB members, in accordance with the terms and conditions of the Disputes Review Board Agreement and these provisions, within 45 days of the approval of the contract. Each party shall provide written notification to the other of the name of their selected DRB member along with the prospective member's written disclosure statement.

Before their appointments are final, the first two prospective DRB members shall submit complete disclosure statements to both the State and the Contractor. The statement shall include a resume of the prospective member's experience, together with a declaration describing all past, present and anticipated or planned future relationships, including indirect relationships through the prospective member's primary or full-time employer, to this project and with all parties involved in this construction contract; including, but not limited to, any relevant subcontractors or suppliers to the parties, the parties' principals or the parties' counsel. The DRB members shall also include a full disclosure of close professional or personal relationships with all key members of all parties to the contract. Either the Contractor or the State may object to the others nominee and that person will not be selected for the DRB. No reason need be given for the first objection. Objections to subsequent nominees must be based on a specific breach or violation of nominee responsibilities under this specification. A different person shall then be nominated within 14 Days. The third DRB member shall supply a full disclosure statement to the first two DRB members and to the parties prior to appointment. Either party may reject any of the three prospective DRB members who fail to fully comply with all required employment and financial disclosure conditions of DRB membership as described in the Disputes Review Board Agreement and elsewhere herein. A copy of the Disputes Review Board Agreement is included in this special provision.

The first duty of the State and Contractor selected members of the DRB is to select and recommend prospective third member(s) to the parties for final selection and approval. The first two DRB members shall proceed with the selection of the third DRB member immediately upon receiving written notification from the State of their selection, and shall provide their recommendation simultaneously to the parties within 21 days of the notification.

An impasse shall be considered to have been reached if the parties are unable to approve a third member within 14 days of receipt of the recommendation of the first two DRB members, or if the first two members are unable to agree upon a recommendation within the 14 day time limit allowed in the preceding paragraph. In the event of an impasse in selection of the third DRB member, the State and the Contractor shall each propose three candidates for the third position. The parties shall select all candidates proposed under this paragraph from the current list of arbitrators certified by the Public Works Contract Arbitration Committee created by Article 7.2 (commencing with Section 10245) of the State Contract Act. The first two DRB members shall then select one of the 6 proposed candidates in a blind draw.

The Contractor, the State, and all three members of the DRB shall complete and adhere to the Disputes Review Board Agreement in administration of this DRB within 14 days of the parties' concurrence in the selection of the third member. The State authorizes the Engineer to execute and administer the terms of the Agreement. The person(s) designated by the Contractor as authorized to execute Contract Change Orders shall be authorized to execute and administer the terms of this agreement, or to delegate the authority in writing. The operation of the DRB shall be in conformance with the terms of the Disputes Review Board Agreement.

The State and the Contractor shall bear the costs and expenses of the DRB equally. Each DRB board member shall be compensated at an agreed rate of \$1,000.00 per day if time spent per meeting, including all on-site time plus one hour of travel time, is greater than four hours. Each DRB board member shall be compensated at an agreed rate of \$600.00 per day if time spent per meeting, including all on-site time plus one hour of travel time, is less than or equal to four hours. The agreed rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof, that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time, (such as time spent evaluating and preparing recommendations on specific issues presented to the DRB), has been specifically agreed to in advance by the State and Contractor. Time away from the project, that has been specifically agreed to in advance by the parties, will be compensated at an agreed rate of \$100.00 per hour. The agreed amount of \$100.00 per hour shall include all incidentals including any expenses for telephone, fax and computer services. Members serving on more than one DRB, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The State will provide, at no cost to the Contractor, administrative services such as conference facilities and secretarial services to the DRB. These special provisions and the Disputes Review Board Agreement state provisions for compensation and expenses of the DRB. All DRB members shall be compensated at the same daily and hourly rate. The Contractor shall make direct payments to each DRB member for their participation in authorized meetings and approved hourly rate charges from invoices submitted by each DRB member. The State will reimburse the Contractor for its share of the costs. There will be no markups applied to any expenses connected with the DRB, either by the DRB members or by the Contractor when requesting payment of the State's share of DRB expenses.

Service of a DRB member may be terminated at any time with not less than 14 days notice as follows:

1. The State may terminate service of the State appointed member.
2. The Contractor may terminate service of the Contractor appointed member.
3. Upon the written recommendation of the State and Contractor members for the removal of the third member.
4. Upon resignation of a member.

When a member of the DRB is replaced, the replacement member shall be appointed in the same manner as the replaced member was appointed. The appointment of a replacement DRB member will begin promptly upon determination of the need for replacement and shall be completed within 14 days. Changes in either of the DRB members chosen by the two parties will not require re-selection of the third member, unless both parties agree to such re-selection in writing. The Disputes Review Board Agreement shall be amended to reflect the change of a DRB member.

The following procedure shall be used for dispute resolution:

1. If the Contractor objects to any decision, act or order of the Engineer, the Contractor shall give written notice of potential claim as specified in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications, including provision of applicable cost documentation; or file written protests or notices pursuant to Sections 4-1.03A, "Procedure and Protest", 8-1.06, "Time of Completion", 8-1.07, "Liquidated Damages", or 8-1.10, "Utility and Non-Highway Facilities" of the Standard Specifications.
2. The Engineer will respond, in writing, to the Contractor's written protest or notice within 14 days of receipt of the written protest or notice.
3. Within 14 days after receipt of the Engineer's written response, the Contractor shall, if the Contractor still objects, file a written reply with the Engineer, stating clearly and in detail the basis of the objection.
4. Following the Contractor's objection to the Engineer's decision, the Contractor shall refer the dispute to the DRB if the Contractor wishes to further pursue the objection to the Engineer's decision. The Contractor shall make the referral in writing to the DRB, simultaneously copied to the State, within 21 days after receipt of the written reply from the Engineer. The written dispute referral shall describe the disputed matter in individual discrete segments so that it will be clear to both parties and the DRB what discrete elements of the dispute have been resolved, and which remain unresolved.
5. The Contractor, by failing to submit the written notice of referral of the matter to the DRB, within 21 days after receipt of the State's written reply, waives any future claims on the matter in contention.
6. The Contractor and the State shall each be afforded an opportunity to be present and to be heard by the DRB, and to offer evidence. Either party furnishing any written evidence or documentation to the DRB must furnish copies of such information to the other party a minimum of 14 days prior to the date the DRB is scheduled to convene the hearing for the dispute. Either party shall produce such additional evidence as the DRB may deem necessary to reach an understanding and determination of the dispute. The party furnishing additional evidence shall furnish copies of such additional evidence to the other party at the same time the evidence is provided to the DRB. The DRB will not consider any evidence not furnished in accordance with the terms specified herein.
7. The DRB shall furnish a report, containing findings and recommendations as described in the Disputes Review Board Agreement, in writing to both the State and the Contractor. The DRB shall complete its reports, including minority opinion if any, and submit them to the parties within 30 days of the DRB hearing, except that time extensions may be granted at the request of the DRB with the written concurrence of both parties. The report shall include the facts and circumstances related to the matters under consideration, applicable laws and regulations, the pertinent provisions of the Contract and the actual costs and time incurred as shown on the Contractor's cost accounting records.
8. Within 30 days after receiving the DRB's report, both the State and the Contractor shall respond to the DRB in writing signifying that the dispute is either resolved or remains unresolved. Failure to provide the written response within the time specified, or a written rejection of the DRB's recommendation presented in the report by either party, shall conclusively indicate that the party(s) failing to respond accepts the DRB recommendation. Immediately after responses have been received by both parties, the DRB will provide copies of both responses to the parties simultaneously. Either party may request clarification of elements of the DRB's report from the DRB prior to responding to the report. The DRB will consider any clarification request only if submitted within 10 days of receipt of the DRB's report, and if submitted simultaneously in writing to both the DRB and the other party. Each party may submit only one request for clarification for any individual DRB report. The DRB shall respond, in writing, to requests for clarification within 10 days of receipt of such requests.
9. The DRB's recommendations, stated in the DRB's reports, are not binding on either party. Either party may seek a reconsideration of a recommendation of the DRB. The DRB shall only grant a reconsideration based upon submission of new evidence and if the request is submitted within the 30 day time limit specified for response to the



DRB's written report. Each party may submit only one request for reconsideration regarding any individual DRB recommendation.

10. If the State and the Contractor are able to resolve their dispute with the aid of the DRB's report, the State and Contractor shall promptly accept and implement the recommendations of the DRB.
11. The State or the Contractor shall not call members who served on the DRB for this contract as witnesses in arbitration proceedings which may arise from this contract, and all documents created by the DRB shall be inadmissible as evidence in subsequent arbitration proceedings, except the DRB's final written reports on each issue brought before it.
12. The State and Contractor shall jointly indemnify and hold harmless the DRB members from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of and resulting from the findings and recommendations of the DRB.
13. The DRB members shall have no claim against the State or the Contractor, or both, from any claimed harm arising out of the parties' evaluations of the DRB's report.

**Disputes Involving Subcontractor Claims.**—For purposes of this section, a "subcontractor claim" shall include any claim by a subcontractor (including also any pass through claims by a lower tier subcontractor or supplier) against the Contractor that is actionable by the Contractor against the Department which arises from the work, services, or materials provided or to be provided in connection with the contract. If the Contractor determines to pursue a dispute against the Department that includes a subcontractor claim, the dispute shall be processed and resolved in accordance with these special provisions and in accordance with the following:

1. The Contractor shall identify clearly in all submissions pursuant to this section, that portion of the dispute that involves a subcontractor claim or claims.
2. The Contractor shall include, as part of its submission pursuant to Step 4 above, a certification (False Claims Act Certification) by the subcontractor's or supplier's officer, partner, or authorized representative with authority to bind the subcontractor and with direct knowledge of the facts underlying the subcontractor claim. The Contractor also shall submit a certification that the subcontractor claim is acknowledged and forwarded by the Contractor. The form for these certifications are available from the Engineer.
3. At any DRB meeting on a dispute that includes one or more subcontractor claims, the Contractor shall require that each subcontractor that is involved in the dispute have present an authorized representative with actual knowledge of the facts underlying the subcontractor claim to assist in presenting the subcontractor claim and to answer questions raised by the DRB members or the Department's representatives.
4. Failure by the Contractor to declare a subcontractor claim on behalf of its subcontractor (including lower tier subcontractors' and suppliers' pass through claims) at the time of submission of the Contractor's claims, as provided hereunder, shall constitute a release of the Department by the Contractor on account of such subcontractor claim.
5. The Contractor shall include in all subcontracts under this contract that subcontractors and suppliers of any tier (a) agree to submit subcontractor claims to the Contractor in a proper form and in sufficient time to allow processing by the Contractor in accordance with the Dispute Review Board resolution specifications; (b) agree to be bound by the terms of the Dispute Review Board provisions to the extent applicable to subcontractor claims; (c) agree that, to the extent a subcontractor claim is involved, completion of all steps required under these Dispute Review Board special provisions shall be a condition precedent to pursuit by the subcontractor of any other remedies permitted by law, including without limitation of a lawsuit against the Contractor; and (d) agree that the existence of a dispute resolution process for disputes involving subcontractor claims shall not be deemed to create any claim, right, or cause of action by any subcontractor or supplier against the Department.

Notwithstanding the foregoing, this Dispute Review Board special provision shall not apply to, and the DRB shall not have the authority to consider, any subcontractor claim between the subcontractor(s) or supplier(s) and the Contractor that is not actionable by the Contractor against the Department.

A copy of the "Disputes Review Board Agreement" to be executed by the Contractor, State and the three DRB members after approval of the contract follows:

#### **DISPUTES REVIEW BOARD AGREEMENT**

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(Contract Identification)

Contract No. «Dist»-«Contract\_No»

Contract No. \_\_\_\_\_

**THIS DISPUTES REVIEW BOARD AGREEMENT, hereinafter called "AGREEMENT"**, made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, between the State of California, acting through the California Department of Transportation and the Director of Transportation, hereinafter called the "STATE"; \_\_\_\_\_ hereinafter called the "CONTRACTOR"; and the Disputes Review Board, hereinafter called the "DRB" consisting of the following members:

\_\_\_\_\_,  
(Contractor Appointee)

\_\_\_\_\_,  
(State Appointee)

and \_\_\_\_\_  
(Third Person)

WITNESSETH, that

WHEREAS, the STATE and the CONTRACTOR, hereinafter called the "parties", are now engaged in the construction on the State Highway project referenced above; and

WHEREAS the special provisions for the above referenced contract provides for the establishment and operation of the DRB to assist in resolving disputes; and

WHEREAS, the DRB is composed of three members, one selected by the STATE, one selected by the CONTRACTOR, and the third member selected by the other two members and approved by the parties;

NOW THEREFORE, in consideration of the terms, conditions, covenants, and performance contained herein, or attached and incorporated and made a part hereof, the STATE, the CONTRACTOR, and the DRB members hereto agree as follows:

## **I DESCRIPTION OF WORK**

To assist in the resolution of disputes between the parties, the contract provides for the establishment and the operation of the DRB. The intent of the DRB is to fairly and impartially consider disputes placed before it and provide written recommendations for resolution of these disputes to both parties. The members of this DRB shall perform the services necessary to participate in the DRB's actions as designated in Section II, Scope of Work.

## **II SCOPE OF WORK**

The scope of work of the DRB includes, but is not limited to, the following:

### **A. Objective**

The principal objective of the DRB is to assist in the timely resolution of disputes between the parties arising from performance of this contract. It is not intended for either party to default on their normal responsibility to amicably and fairly settle their differences by indiscriminately assigning them to the DRB. It is intended that the mere existence of the DRB will encourage the parties to resolve disputes without resorting to this review procedure. But when a dispute which is serious enough to warrant the DRB's review does develop, the process for prompt and efficient action will be in place.

### **B. Procedures**

The DRB shall render written reports on disputes between the parties arising from the construction contract. Prior to consideration of a dispute, the DRB shall establish rules and regulations that will govern the conduct of its business and reporting procedures in accordance with the requirements of the contract and the terms of this AGREEMENT. DRB recommendations, resulting from its consideration of a dispute, shall be furnished in writing to both parties. The

recommendations shall be based on the pertinent contract provisions, and the facts and circumstances involved in the dispute. The recommendations shall find one responsible party in a dispute; shared or “jury” determinations shall not be rendered.

The DRB shall refrain from officially giving any advice or consulting services to anyone involved in the contract. The individual members shall act in a completely independent manner and while serving as members of the DRB shall have no consulting business connections with either party or its principals or attorneys or any other affiliates (subcontractors, suppliers, etc.) who have a beneficial interest in the contract.

During scheduled meetings of the DRB as well as during dispute hearings, DRB members shall refrain from expressing opinions on the merits of statements on matters under dispute or potential dispute. Opinions of DRB members expressed in private sessions shall be kept strictly confidential. Individual DRB members shall not meet with, or discuss contract issues with individual parties, except as directed by the DRB Chairperson. Any such discussions or meetings shall be disclosed to both parties. Any other discussions regarding the project between the DRB members and the parties shall be in the presence of all three members and both parties. Individual DRB members shall not undertake independent investigations of any kind pertaining to disputes or potential disputes, except with the knowledge of both parties and as expressly directed by the DRB Chairperson.

### **C. Construction Site Visits, Progress Meetings and Field Inspections**

The DRB members shall visit the project site and meet with representatives of the parties to keep abreast of construction activities and to develop familiarity with the work in progress. All scheduled progress meetings shall be held at or near the job site. The DRB shall meet at least once at the start of the project, and at least once every six months thereafter. The frequency, exact time, and duration of additional site visits and progress meetings shall be as recommended by the DRB and approved by the parties consistent with the construction activities or matters under consideration and dispute. Each meeting shall consist of a round table discussion and a field inspection of the work being performed on the contract, if necessary. Each meeting shall be attended by representatives of both parties. The agenda shall generally be as follows:

1. Meeting opened by the DRB Chairperson.
2. Remarks by the STATE's representative.
3. A description by the CONTRACTOR's representative of work accomplished since the last meeting; the current schedule status of the work; and a forecast for the coming period.
4. An outline by the CONTRACTOR's representative of potential problems and a description of proposed solutions.
5. An outline by the STATE's representative of the status of the work as the STATE views it.
6. A brief description by the CONTRACTOR's or STATE's representative of potential claims or disputes which have surfaced since the last meeting.
7. A summary by the STATE's representative, the CONTRACTOR's representative, or the DRB of the status of past disputes and claims.

The STATE's representative will prepare minutes of all regular meetings and circulate them for revision and approval by all concerned.

The field inspection shall cover all active segments of the work, the DRB being accompanied by both parties' representatives. The field inspection may be waived upon mutual agreement of the parties.

### **D. DRB Consideration and Handling of Disputes**

Upon receipt by the DRB of a written referral of a dispute, the DRB shall convene to review and consider the dispute. The DRB shall determine the time and location of DRB hearings, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of speedy resolution of issues. If the matter is not urgent, it may be scheduled for the time of the next scheduled DRB visit to the project. For an urgent matter, and upon the request of either party, the DRB shall meet at its earliest convenience.

Normally, hearings shall be conducted at or near the project site. However, any location which would be more convenient and still provide all required facilities and access to necessary documentation shall be satisfactory.

Both parties shall be given the opportunity to present their evidence at these hearings. It is expressly understood that the DRB members are to act impartially and independently in the consideration of the contract provisions, and the facts and conditions surrounding any dispute presented by either party, and that the recommendations concerning any such dispute are advisory and nonbinding on the parties.

The DRB may request that written documentation and arguments from both parties be sent to each DRB member, through the DRB Chairperson, for review before the hearing begins. A party furnishing any written documentation to the DRB shall furnish copies of such information to the other party at the same time that such information is supplied to the DRB.

DRB hearings shall be informal. There shall be no testimony under oath or cross-examination. There shall be no reporting of the procedures by a shorthand reporter or by any electronic means. Documents and verbal statements shall be received by the DRB in accordance with acceptance standards established by the DRB. Said standards need not comply with prescribed legal laws of evidence.

The third DRB member shall act as Chairperson for dispute hearings and all other DRB activities. The parties shall have a representative at all hearings. Failure to attend a duly noticed meeting by either of the parties shall be conclusively considered by the DRB as indication that the non-attending party considers any written submittals as their entire and complete argument. The claimant shall discuss the dispute, followed by the other party. Each party shall then be allowed one or more rebuttals until all aspects of the dispute are thoroughly covered. DRB members may ask questions, seek clarification, or request further data from either of the parties. The DRB may request from either party documents or information that would assist the DRB in making its findings and recommendations including, but not limited to, documents used by the CONTRACTOR in preparing the bid for the project. A refusal by a party to provide information requested by the DRB may be considered by the DRB as an indication that the requested material would tend to disprove that party's position. Claims shall not necessarily be computed by merely subtracting bid price from the total cost of the affected work. However, if any claims are based on the "total cost method", then, to be considered by the DRB, they shall be supported by evidence furnished by the CONTRACTOR that (1) the nature of the dispute(s) makes it impossible or impracticable to determine cost impacts with a reasonable degree of accuracy, (2) the CONTRACTOR's bid estimate was realistic, (3) the CONTRACTOR's actual costs were reasonable, and (4) the CONTRACTOR was not responsible for the added expenses. As to any claims based on the CONTRACTOR's field or home office accounting records, those claims shall be supported by an audit report of an independent Certified Public Accountant unless the contract includes special provisions that provide for an alternative method to calculate unabsorbed home office overhead. Any of those claims shall also be subject to audit by the DRB with the concurrence of the parties. In large or complex cases, additional hearings may be necessary in order to consider all the evidence presented by both parties. All involved parties shall maintain the confidentiality of all documents and information, as provided in this AGREEMENT.

During dispute hearings, no DRB member shall express an opinion concerning the merit of any facet of the case. All DRB deliberations shall be conducted in private, with all interim individual views kept strictly confidential.

After hearings are concluded, the DRB shall meet in private and reach a conclusion supported by two or more members. Private sessions of the DRB may be held at a location other than the job site or by electronic conferencing as deemed appropriate, in order to expedite the process.

The DRB's findings and recommendations, along with discussion of reasons therefor, shall then be submitted as a written report to both parties. Recommendations shall be based on the pertinent contract provisions, applicable laws and regulations, and facts and circumstances related to the dispute. The report shall be thorough in discussing the facts considered, the contract language, law or regulation viewed by the DRB as pertinent to the issues, and the DRB's interpretation and philosophy in arriving at its conclusions and recommendations. The DRB's report shall stand on its own, without attachments or appendices. The DRB chairman shall complete and furnish a summary report to the DRB Program Manager, Construction Program, M.S. 44, P.O. Box 942874, Sacramento, CA 94274.

With prior written approval of both parties, the DRB may obtain technical services necessary to adequately review the disputes presented; including audit, geotechnical, schedule analysis and other services. The parties' technical staff may supply those services as appropriate. The cost of any technical services, as agreed to by the parties, shall be borne equally by the two parties as specified in an approved contract change order. The CONTRACTOR will not be entitled to markups for the payments made for these services.

The DRB shall resist submittal of incremental portions of information by either party, in the interest of making a fully-informed decision and recommendation.

The DRB shall make every effort to reach a unanimous decision. If this proves impossible, the dissenting member shall prepare a minority opinion, which shall be included in the DRB's report.

Although both parties should place weight upon the DRB's recommendations, they are not binding. Either party may appeal a recommendation to the DRB for reconsideration. However, reconsideration shall only be allowed when there is new evidence to present, and the DRB shall accept only one appeal from each party pertaining to any individual DRB recommendation. The DRB shall hear appeals in accordance with the terms described in the Section entitled "Disputes Review Board" in the special provisions.

#### **E. DRB Member Replacement**

Should the need arise to appoint a replacement DRB member, the replacement DRB member shall be appointed in the same manner as the original DRB members were appointed. The selection of a replacement DRB member shall begin promptly upon notification of the necessity for a replacement and shall be completed within 14 days. This AGREEMENT will be amended to indicate change in DRB membership.

### **III CONTRACTOR RESPONSIBILITIES**

The CONTRACTOR shall furnish to each DRB member one copy of all pertinent documents which are or may become necessary for the DRB to perform their function. Pertinent documents are any drawings or sketches, calculations, procedures, schedules, estimates, or other documents which are used in the performance of the work or in justifying or substantiating the CONTRACTOR's position. The CONTRACTOR shall also furnish a copy of such pertinent documents to the STATE, in accordance with the terms outlined in the special provisions.

### **IV STATE RESPONSIBILITIES**

The STATE will furnish the following services and items:

#### **A. Contract Related Documents**

The STATE will furnish to each DRB member one copy of Notice to Contractors and Special Provisions, Proposal and Contract, Plans, Standard Specifications, and Standard Plans, change orders, written instructions issued by the STATE to the CONTRACTOR, or other documents pertinent to any dispute that has been referred to the DRB and necessary for the DRB to perform its function.

#### **B. Coordination and Services**

The STATE, through the Engineer, will, in cooperation with the CONTRACTOR, coordinate the operations of the DRB. The Engineer will arrange or provide conference facilities at or near the project site and provide secretarial and copying services to the DRB without charge to the CONTRACTOR.

### **V TIME FOR BEGINNING AND COMPLETION**

Once established, the DRB shall be in operation until the day of acceptance of the contract. The DRB members shall not begin any work under the terms of this AGREEMENT until authorized in writing by the STATE.

### **VI PAYMENT**

#### **A. All Inclusive Rate Payment**

The STATE and the CONTRACTOR shall bear the costs and expenses of the DRB equally. Each DRB board member shall be compensated at an agreed rate of \$1,000.00 per day if time spent per meeting, including all on-site time plus one hour of travel time, is greater than four hours. Each DRB board member shall be compensated at an agreed rate of \$600.00 per day if time spent per meeting, including all on-site time plus one hour of travel time, is less than or equal to four hours. The agreed rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof, that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time has been specifically agreed to in advance by the STATE and CONTRACTOR. Time away from the project, that has been specifically agreed to in advance by the parties, will be compensated at an agreed rate of \$100.00 per hour. The agreed amount of \$100.00 per hour shall include all incidentals including any expenses for telephone, fax and computer services. Members serving on more than one DRB, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The STATE will provide, at no cost to the CONTRACTOR, administrative services such as conference facilities and secretarial services to the DRB.

#### **B. Payments**

All DRB members shall be compensated at the same rate. The CONTRACTOR shall make direct payments to each DRB member for their participation in authorized meetings and approved hourly rate charges from invoices submitted by each DRB member. The STATE will reimburse the CONTRACTOR for its share of the costs of the DRB.

The DRB members may submit invoices to the CONTRACTOR for partial payment for work performed and services rendered for their participation in authorized meetings not more often than once per month during the progress of the work.

Contract No. «Dist»-«Contract\_No»

The invoices shall be in a format approved by the parties and accompanied by a general description of activities performed during that billing period. Payment for any hourly fees, at the agreed rate, shall not be paid to a DRB member until the amount and extent of those fees are approved by the STATE and CONTRACTOR.

Invoices shall be accompanied by original supporting documents, which the CONTRACTOR shall include with the extra work billing when submitting for reimbursement of the STATE's share of cost from the STATE. The CONTRACTOR will be reimbursed for one-half of approved costs of the DRB. No markups will be added to the CONTRACTOR's payment.

### **C. Inspection of Costs Records**

The DRB members and the CONTRACTOR shall keep available for inspection by representatives of the STATE and the United States, for a period of three years after final payment, the cost records and accounts pertaining to this AGREEMENT. If any litigation, claim, or audit arising out of, in connection with, or related to this contract is initiated before the expiration of the three-year period, the cost records and accounts shall be retained until such litigation, claim, or audit involving the records is completed.

## **VII ASSIGNMENT OF TASKS OF WORK**

The DRB members shall not assign any of the work of this AGREEMENT.

## **VIII TERMINATION OF AGREEMENT, THE DRB, AND DRB MEMBERS**

DRB members may resign from the DRB by providing not less than 14 days written notice of the resignation to the STATE and CONTRACTOR. DRB members may be terminated by their original appointing power, in accordance with the terms of the contract.

## **IX LEGAL RELATIONS**

The parties hereto mutually understand and agree that the DRB member in the performance of duties on the DRB, is acting in the capacity of an independent agent and not as an employee of either party.

No party to this AGREEMENT shall bear a greater responsibility for damages or personal injury than is normally provided by Federal or State of California Law.

Notwithstanding the provisions of this contract that require the CONTRACTOR to indemnify and hold harmless the STATE, the parties shall jointly indemnify and hold harmless the DRB members from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of and resulting from the findings and recommendations of the DRB.

## **X CONFIDENTIALITY**

The parties hereto mutually understand and agree that all documents and records provided by the parties in reference to issues brought before the DRB, which documents and records are marked "Confidential - for use by the DRB only", shall be kept in confidence and used only for the purpose of resolution of subject disputes, and for assisting in development of DRB findings and recommendations; that such documents and records will not be utilized or revealed to others, except to officials of the parties who are authorized to act on the subject disputes, for any purposes, during the life of the DRB. Upon termination of this AGREEMENT, said confidential documents and records, and all copies thereof, shall be returned to the parties who furnished them to the DRB. However, the parties understand that such documents shall be subsequently discoverable and admissible in court or arbitration proceedings unless a protective order has been obtained by the party seeking further confidentiality.

## **XI DISPUTES**

Any dispute between the parties hereto, including disputes between the DRB members and either party or both parties, arising out of the work or other terms of this AGREEMENT, which cannot be resolved by negotiation and mutual concurrence between the parties, or through the administrative process provided in the contract, shall be resolved by arbitration as provided in Section 9-1.10, "Arbitration," of the Standard Specifications.

Contract No. «Dist»-«Contract\_No»

**XII**  
**VENUE, APPLICABLE LAW, AND PERSONAL JURISDICTION**

In the event that any party, including an individual member of the DRB, deems it necessary to institute arbitration proceedings to enforce any right or obligation under this AGREEMENT, the parties hereto agree that any such action shall be initiated in the Office of Administrative Hearings of the State of California. The parties hereto agree that all questions shall be resolved by arbitration by application of California law and that the parties to such arbitration shall have the right of appeal from such decisions to the Superior Court in accordance with the laws of the State of California. Venue for the arbitration shall be Sacramento or any other location as agreed to by the parties.

**XIII**  
**FEDERAL REVIEW AND REQUIREMENTS**

On Federal-Aid contracts, the Federal Highway Administration shall have the right to review the work of the DRB in progress, except for any private meetings or deliberations of the DRB.  
All other Federal requirements in this agreement shall only apply to Federal-Aid contracts.

**XIV**  
**CERTIFICATION OF THE CONTRACTOR,  
THE DRB MEMBERS, AND THE STATE**

IN WITNESS WHEREOF, the parties hereto have executed this AGREEMENT as of the day and year first above written.

DRB MEMBER

DRB MEMBER

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title : \_\_\_\_\_

DRB MEMBER

By : \_\_\_\_\_

Title : \_\_\_\_\_

CONTRACTOR

CALIFORNIA STATE DEPARTMENT  
OF TRANSPORTATION

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

**5-1.13 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS**

The provisions of this section shall apply only to the following contract items:

ITEM CODE	ITEM
390155	ASPHALT CONCRETE (TYPE A)
391031	PAVING ASPHALT (BINDER-PAVEMENT REINFORCING FABRIC)

The compensation payable for asphalt concrete and paving asphalt (binder-pavement reinforcing fabric) will be subject to being increased or decreased in accordance with the provisions of this section for paving asphalt price fluctuations exceeding 5 percent (Iu/Ib is greater than 1.05 or less than 0.95) which occur during performance of the work.

The adjustment in compensation will be determined in accordance with the following formulae when the item of asphalt concrete or paving asphalt (binder-pavement reinforcing fabric) (or both) is included in a monthly estimate:

Contract No. «Dist»-«Contract\_No»

Total monthly adjustment = AQ

For an increase in paving asphalt price index exceeding 5 percent:

$$A = 0.90 (1.1023) (I_u/I_b - 1.05) I_b$$

For a decrease in paving asphalt price index exceeding 5 percent:

$$A = 0.90 (1.1023) (I_u/I_b - 0.95) I_b$$

Where:

A = Adjustment in dollars per tonne of paving asphalt used to produce asphalt concrete and used as a binder for pavement reinforcing fabric rounded to the nearest \$0.01.

I<sub>u</sub> = The California Statewide Paving Asphalt Price Index which is in effect on the first business day of the month within the pay period in which the quantity subject to adjustment was included in the estimate.

I<sub>b</sub> = The California Statewide Paving Asphalt Price Index for the month in which the bid opening for the project occurred.

Q = Quantity in tonnes of paving asphalt that was used as a binder for pavement reinforcing fabric plus the quantity of paving asphalt that was used in producing the quantity of asphalt concrete shown under "This Estimate" on the monthly estimate using the amount of asphalt determined by the Engineer.

The adjustment in compensation will also be subject to the following:

1. The compensation adjustments provided herein, will be shown separately on payment estimates. The Contractor shall be liable to the State for decreased compensation adjustments and the Department may deduct the amount thereof from any moneys due or that may become due the Contractor.
2. Compensation adjustments made under this section will be taken into account in making adjustments under Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.
3. The total price adjustment for price index increases of paving asphalt on this project shall not exceed \$689,000.
4. In the event of an overrun of contract time, adjustment in compensation for paving asphalt included in estimates during the overrun period will be determined using the California Statewide Paving Asphalt Price Index in effect on the first business day of the month within the pay period in which the overrun began.

The California Statewide Paving Asphalt Price Index is determined each month on the first business day of the month by the Department using the median of posted prices in effect as posted by Chevron, Mobil and Unocal for the Buena Vista, Huntington Beach, Kern River, Long Beach, Midway Sunset and Wilmington fields.

In the event that any of the companies discontinue posting their prices for any field, the Department will determine an index from the remaining posted prices. The Department reserves the right to include in the index determination the posted prices of additional fields.

#### **5-1.14 AREAS FOR CONTRACTOR'S USE**

Attention is directed to the requirements specified in Section 7-1.19, "Rights in Land and Improvements," of the Standard Specifications and these special provisions.

The highway right of way shall be used only for purposes that are necessary to perform the required work. The Contractor shall not occupy the right of way, or allow others to occupy the right of way, for purposes which are not necessary to perform the required work.

There are no State-owned parcels adjacent to the right of way for the exclusive use of the Contractor within the contract limits. The Contractor shall secure, at the Contractor's own expense, any area required for plant sites, storage of equipment or materials, or for other purposes.

No area is available within the contract limits for the exclusive use of the Contractor. Use of the Contractor's work areas and other State-owned property shall be at the Contractor's own risk, and the State shall not be held liable for any damage to or loss of materials or equipment located within such areas.



### **5-1.15 PAYMENTS**

Attention is directed to Sections 9-1.06, "Partial Payments," and 9-1.07, "Payment After Acceptance," of the Standard Specifications and these special provisions.

For the purpose of making partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications, the amount set forth for the contract items of work hereinafter listed shall be deemed to be the maximum value of the contract item of work which will be recognized for progress payment purposes:

Clearing and Grubbing      \$90,000.00

After acceptance of the contract pursuant to Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, the amount, if any, payable for a contract item of work in excess of the maximum value for progress payment purposes hereinabove listed for the item, will be included for payment in the first estimate made after acceptance of the contract.

In determining the partial payments to be made to the Contractor, only the following listed materials will be considered for inclusion in the payment as materials furnished but not incorporated in the work:

Pavement Reinforcing Fabric  
Rock Slope Protection Fabric  
Downdrain Pipe and Appurtenances  
Culvert Pipe and Appurtenances  
Miscellaneous Iron and Steel  
Guard Railing and Appurtenances  
Chain Link Fence and Gates  
Miscellaneous Drainage Facilities

### **5-1.16 WATER CONSERVATION**

Attention is directed to the various sections of the Standard Specifications and these special provisions which require the use of water for the construction of this project. Attention is also directed to the provisions of Section 7, "Legal Relations and Responsibility," of the Standard Specifications with regards to the Contractor's responsibilities for public convenience, public safety, preservation of property, indemnification, and insurance.

Nothing in this section "Water Conservation" shall be construed as relieving the Contractor from furnishing an adequate supply of water required for the proper construction of this project in accordance with the Standard Specifications or these special provisions or relieving the Contractor from the legal responsibilities defined in Section 7.

The Contractor shall, whenever possible and not in conflict with the above requirements, minimize the use of water during construction of the project. Watering equipment shall be kept in good working order; water leaks shall be repaired promptly; and washing of equipment, except when necessary for safety or for the protection of equipment, shall be discouraged.

### **5-1.17 RELATIONS WITH CALIFORNIA DEPARTMENT OF FISH AND GAME**

A portion of this project is located within the jurisdiction of the California Department of Fish and Game. An agreement regarding a stream or lake has been entered into by the Department of Transportation and the Department of Fish and Game. The Contractor shall be fully informed of the requirements of this agreement as well as all rules, regulations, and conditions that may govern the Contractor's operations in these areas and shall conduct the work accordingly.

Copies of the agreement may be obtained at the Department of Transportation, Plans and Bid Documents Section (MS 26), 1120 N Street, Room 200, Sacramento, CA 95814, Telephone No. (916)654-4490, and are available for inspection at the office of the District Director of Transportation at the Northern Region Construction Office at 379-A Colusa Highway, Yuba City, California 95991.

It is unlawful for any person to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any stream, river, or lake without first notifying the Department of Fish and Game, unless the project or activity is noticed and constructed in accordance with all conditions imposed under Fish and Game Code Section 1601.

Attention is directed to Sections 7-1.01, "Laws to be Observed," 7-1.01G, "Water Pollution," 7-1.121, "Indemnification," and 7-1.122, "Insurance," of the Standard Specifications.

Any modifications to the agreement between the Departments of Transportation and Fish and Game which are proposed by the Contractor shall be submitted in writing to the Engineer for transmittal to the Department of Fish and Game for their consideration.

When the Contractor is notified by the Engineer that a modification to the agreement is under consideration, no work will be allowed which is inconsistent with the proposed modification until the Departments take action on the proposed modifications. Compensation for delay will be determined in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The provisions of this section shall be made a part of every subcontract executed pursuant to this contract.

Any modifications to any agreement between the Departments of Transportation and Fish and Game will be fully binding on the Contractor, and the provisions of this section shall be made a part of every subcontract executed pursuant to this contract.

#### **5-1.18 RELATIONS WITH CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD**

The location of the project is within an area controlled by the Regional Water Quality Control Board. Regional Water Quality Control Board "Waiver of Waste Discharge Requirements and Water Quality Certification For: Interstate 80 Improvements, Placer County" has been issued covering work to be performed under this contract. The Contractor shall be fully informed of all rules, regulations and conditions that may govern the Contractor's operations in the areas and shall conduct the work accordingly.

Copies of the waiver may be obtained at the Department of Transportation, Plans and Bid Documents Section (MS 26), 1120 N Street, Room 200, Sacramento, CA 95814, Telephone No. (916)654-4490, and are available for inspection at the office of the District Director of Transportation at the Northern Region Construction Office at 379-A Colusa Highway, Yuba City, California 95991.

Attention is directed to Sections 7-1.11, "Preservation of Property," 7-1.121, "Indemnification," and 7-1.122, "Insurance," of the Standard Specifications.

Attention is directed to Section 8-1.06, "Time of Completion," of the Standard Specifications. Days when the Contractor's operations are restricted by the requirements of this section shall not be considered to be nonworking days whether or not the controlling operation is delayed.

#### **5-1.19 RELATIONS WITH UNITED STATES ARMY CORPS OF ENGINEERS**

A portion of this project is located within the jurisdiction of the United States Army Corps of Engineers. A permit regarding Contract 03-1A80Ü4 has been entered into by the Department and the United States Army Corps of Engineers. The Contractor shall be fully informed of the requirements of the permit as well as all rules, regulations, and conditions that may govern operations in said area and shall conduct operations accordingly.

Copies of the permit may be obtained at the Department of Transportation, Plans and Bid Documents Section (MS 26), 1120 N Street, Room 200, Sacramento, CA 95814, Telephone No. (916)654-4490, and are available for inspection at the office of the District Director of Transportation at the Northern Region Construction Office at 379-A Colusa Highway, Yuba City, California 95991.

Attention is directed to Sections 7-1.01, "Laws to be Observed," 7-1.01G, "Water Pollution," and 7-1.12, "Responsibility for Damage," of the Standard Specifications.

When the Contractor is notified by the Engineer that a modification to the permit is under consideration, no work will be allowed which is inconsistent with the proposed modification until the Department takes action on the proposed modifications. Compensation for delay will be determined in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The provisions of this section shall be made a part of every subcontract executed pursuant to this contract.

Any modifications to the permit entered into by the Department and the United States Army Corps of Engineers shall be fully binding on the Contractor.

#### **5-1.20 RELATIONS WITH PLACER COUNTY**

A portion of this project is located within the jurisdiction of Placer County. A permit regarding work in County rights of way has been entered into by the Department and the County of Placer. The Contractor shall be fully informed of the requirements of the permit as well as all rules, regulations, and conditions that may govern operations in said area and shall conduct operations accordingly.

Copies of the permit may be obtained at the Department of Transportation, Plans and Bid Documents Section (MS 26), 1120 N Street, Room 200, Sacramento, CA 95814, Telephone No. (916)654-4490, and are available for inspection at the office of the District Director of Transportation at the Northern Region Construction Office at 379-A Colusa Highway, Yuba City, California 95991.

Attention is directed to Sections 7-1.01, "Laws to be Observed," 7-1.01G, "Water Pollution," and 7-1.12, "Responsibility for Damage," of the Standard Specifications.

When the Contractor is notified by the Engineer that a modification to the permit is under consideration, no work will be allowed which is inconsistent with the proposed modification until the Department takes action on the proposed modifications. Compensation for delay will be determined in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The provisions of this section shall be made a part of every subcontract executed pursuant to this contract.

Any modifications to the permit entered into by the Department and Placer County shall be fully binding on the Contractor.

### 5-1.21 ENVIRONMENTALLY SENSITIVE AREAS

The Contractor's attention is directed to the areas designated on the plans as "Environmentally Sensitive Areas" and State and Federal regulations which may pertain to such areas. These areas are protected and no entry by the Contractor for any purpose will be allowed unless specifically authorized in writing by the Engineer. The Contractor shall take measures to ensure that his forces do not enter or disturb these areas, including giving written notice to his employees and subcontractors.

Full compensation for complying with State or Federal regulations and protecting the environmentally sensitive areas shall be considered as included in the contract prices paid for the various contract items of work and no additional compensation will be allowed therefor.

The Contractor will be required to pay the cost of any mitigation or repairs to the environmentally sensitive areas, shown on the plans or fenced with temporary fencing, that are damaged or impacted by reason of the Contractor's or his subcontractor's operations and deductions from any moneys due or to become due the Contractor will be made to cover such cost.

### SECTION 6. (BLANK)

### SECTION 7. (BLANK)

### SECTION 8. MATERIALS

#### SECTION 8-1. MISCELLANEOUS

### 8-1.01 SUBSTITUTION OF NON-METRIC MATERIALS AND PRODUCTS

Only materials and products conforming to the requirements of the specifications shall be incorporated in the work. When metric materials and products are not available, and when approved by the Engineer, and at no cost to the State, materials and products in the inch-pound (imperial) system which are of equal quality and of the required properties and characteristics for the purpose intended, may be substituted for the equivalent metric materials and products, subject to the following provisions:

Materials and products shown on the plans or in the special provisions as being equivalent may be substituted for the metric materials and products specified or detailed on the plans.

Before other non-metric materials and products will be considered for use the Contractor shall furnish, at the Contractor's expense, evidence satisfactory to the Engineer that the materials and products proposed for use are equal to or better than the materials and products specified or detailed on the plans. The burden of proof as to the quality and suitability of substitutions shall be upon the Contractor and the Contractor shall furnish necessary information as required by the Engineer. The Engineer will be the sole judge as to the quality and suitability of the substituted materials and products and the Engineer's decision will be final.

When the Contractor elects to substitute non-metric materials and products, including materials and products shown on the plans or in the special provisions as being equivalent, the list of sources of material as specified in Section 6-1.01, "Source of Supply and Quality of Materials," of the Standard Specification shall include a list of substitutions to be made and contract items involved. In addition, for a change in design or details the Contractor shall submit plans and working drawings in conformance with Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

Unless otherwise specified, the following substitutions of materials and products will be allowed:

#### SUBSTITUTION TABLE FOR SIZES OF HIGH STRENGTH STEEL FASTENERS

ASTM Designation: A 325M

METRIC SIZE SHOWN ON THE PLANS mm x thread pitch	IMPERIAL SIZE TO BE SUBSTITUTED inch
M16 x 2	5/8
M20 x 2.5	3/4
M22 x 2.5	7/8
M24 x 3	1
M27 x 3	1-1/8
M30 x 3.5	1-1/4
M36 x 4	1-1/2

**SUBSTITUTION TABLE FOR PLAIN WIRE REINFORCEMENT, ASTM Designation: A 82**

METRIC SIZE SHOWN ON THE PLANS mm <sup>2</sup>	US CUSTOMARY UNITS SIZE TO BE SUBSTITUTED inch <sup>2</sup> x 100
MW9	W1.4
MW10	W1.6
MW13	W2.0
MW15	W2.3
MW19	W2.9
MW20	W3.1
MW22	W3.5
MW25	W3.9, except W3.5 in piles only
MW26	W4.0
MW30	W4.7
MW32	W5.0
MW35	W5.4
MW40	W6.2
MW45	W6.5
MW50	W7.8
MW55	W8.5, except W8.0 in piles only
MW60	W9.3
MW70	W10.9, except W11.0 in piles only
MW80	W12.4
MW90	W14.0
MW100	W15.5

**SUBSTITUTION TABLE FOR BAR REINFORCEMENT**

METRIC BAR DESIGNATION NUMBER SHOWN ON THE PLANS	EQUIVALENT IMPERIAL BAR DESIGNATION NUMBER TO BE SUBSTITUTED
13	4
16	5
19	6
22	7
25	8
29	9
32	10
36	11
43	14
57	18

No adjustment will be required in spacing or total number of reinforcing bars due to a difference in minimum yield strength between metric and non-metric bars.

The sizes in the following tables of materials and products are exact conversions of metric sizes of materials and products and are listed as acceptable equivalents:

CONVERSION TABLE FOR SIZES OF:

- (1) STEEL FASTENERS FOR GENERAL APPLICATIONS, ASTM Designation: A 307 or AASHTO Designation: M 314, Grade 36 or 55, and  
 (2) HIGH STRENGTH STEEL FASTENERS, ASTM Designation: A 325 or A 449

METRIC SIZE SHOWN ON THE PLANS mm	EQUIVALENT IMPERIAL SIZE inch
6, or 6.35	1/4
8 or 7.94	5/16
10, or 9.52	3/8
11, or 11.11	7/16
13 or 12.70	1/2
14, or 14.29	9/16
16, or 15.88	5/8
19, or 19.05	3/4
22, or 22.22	7/8
24, 25, or 25.40	1
29, or 28.58	1-1/8
32, or 31.75	1-1/4
35, or 34.93	1-3/8
38 or 38.10	1-1/2
44, or 44.45	1-3/4
51, or 50.80	2
57, or 57.15	2-1/4
64, or 63.50	2-1/2
70 or 69.85	2-3/4
76, or 76.20	3
83, or 82.55	3-1/4
89 or 88.90	3-1/2
95, or 95.25	3-3/4
102, or 101.60	4

**CONVERSION TABLE FOR NOMINAL THICKNESS OF SHEET METAL**

UNCOATED HOT AND COLD ROLLED SHEETS		HOT-DIPPED ZINC COATED SHEETS (GALVANIZED)	
METRIC THICKNESS SHOWN ON THE PLANS	EQUIVALENT US STANDARD GAGE	METRIC THICKNESS SHOWN ON THE PLANS	EQUIVALENT GALVANIZED SHEET GAGE
mm	inch	mm	inch
7.94	0.3125	4.270	0.1681
6.07	0.2391	3.891	0.1532
5.69	0.2242	3.510	0.1382
5.31	0.2092	3.132	0.1233
4.94	0.1943	2.753	0.1084
4.55	0.1793	2.372	0.0934
4.18	0.1644	1.994	0.0785
3.80	0.1495	1.803	0.0710
3.42	0.1345	1.613	0.0635
3.04	0.1196	1.461	0.0575
2.66	0.1046	1.311	0.0516
2.28	0.0897	1.158	0.0456
1.90	0.0747	1.006 or 1.016	0.0396
1.71	0.0673	0.930	0.0366
1.52	0.0598	0.853	0.0336
1.37	0.0538	0.777	0.0306
1.21	0.0478	0.701	0.0276
1.06	0.0418	0.627	0.0247
0.91	0.0359	0.551	0.0217
0.84	0.0329	0.513	0.0202
0.76	0.0299	0.475	0.0187
0.68	0.0269	-----	-----
0.61	0.0239	-----	-----
0.53	0.0209	-----	-----
0.45	0.0179	-----	-----
0.42	0.0164	-----	-----
0.38	0.0149	-----	-----

**CONVERSION TABLE FOR WIRE**

METRIC THICKNESS SHOWN ON THE PLANS mm	EQUIVALENT USA STEEL WIRE THICKNESS inch	GAGE NO.
6.20	0.244	3
5.72	0.225	4
5.26	0.207	5
4.88	0.192	6
4.50	0.177	7
4.11	0.162	8
3.76	0.148	9
3.43	0.135	10
3.05	0.120	11
2.69	0.106	12
2.34	0.092	13
2.03	0.080	14
1.83	0.072	15
1.57	0.062	16
1.37	0.054	17
1.22	0.048	18
1.04	0.041	19
0.89	0.035	20

**CONVERSION TABLE FOR PIPE PILES**

METRIC SIZE SHOWN ON THE PLANS mm x mm	EQUIVALENT IMPERIAL SIZE inch x inch
PP 360 x 4.55	NPS 14 x 0.179
PP 360 x 6.35	NPS 14 x 0.250
PP 360 x 9.53	NPS 14 x 0.375
PP 360 x 11.12	NPS 14 x 0.438
PP 406 x 12.70	NPS 16 x 0.500
PP 460 x T	NPS 18 x T"
PP 508 x T	NPS 20 x T"
PP 559 x T	NPS 22 x T"
PP 610 x T	NPS 24 x T"
PP 660 x T	NPS 26 x T"
PP 711 x T	NPS 28 x T"
PP 762 x T	NPS 30 x T"
PP 813 x T	NPS 32 x T"
PP 864 x T	NPS 34 x T"
PP 914 x T	NPS 36 x T"
PP 965 x T	NPS 38 x T"
PP 1016 x T	NPS 40 x T"
PP 1067 x T	NPS 42 x T"
PP 1118 x T	NPS 44 x T"
PP 1219 x T	NPS 48 x T"
PP 1524 x T	NPS 60 x T"

The thickness in inches (T") represents an exact conversion of the metric thickness in millimeters (T).

**CONVERSION TABLE FOR STRUCTURAL TIMBER AND LUMBER**

METRIC MINIMUM DRESSED DRY, SHOWN ON THE PLANS mm x mm	METRIC MINIMUM DRESSED GREEN, SHOWN ON THE PLANS mm x mm	EQUIVALENT NOMINAL US SIZE inch x inch
19x89	20x90	1x4
38x89	40x90	2x4
64x89	65x90	3x4
89x89	90x90	4x4
140x140	143x143	6x6
140x184	143x190	6x8
184x184	190x190	8x8
235x235	241x241	10x10
286x286	292x292	12x12

**CONVERSION TABLE FOR NAILS AND SPIKES**

METRIC COMMON NAIL, SHOWN ON THE PLANS  Length, mm Diameter, mm	METRIC BOX NAIL, SHOWN ON THE PLANS  Length, mm Diameter, mm	METRIC SPIKE, SHOWN ON THE PLANS Length, mm Diameter, mm	EQUIVALENT IMPERIAL SIZE  Penny-weight
50.80 2.87	50.80 2.51	————	6d
63.50 3.33	63.50 2.87	————	8d
76.20 3.76	76.20 3.25	76.20 4.88	10d
82.55 3.76	82.55 3.25	82.55 4.88	12d
88.90 4.11	88.90 3.43	88.90 5.26	16d
101.60 4.88	101.60 3.76	101.60 5.72	20d
114.30 5.26	114.30 3.76	114.30 6.20	30d
127.00 5.72	127.00 4.11	127.00 6.68	40d
————	————	139.70 7.19	50d
————	————	152.40 7.19	60d

### 8-1.02 APPROVED TRAFFIC PRODUCTS

The Department maintains a List of Approved Traffic Products. The Engineer shall not be precluded from sampling and testing products on the List of Approved Traffic Products.

The manufacturer of products on the List of Approved Traffic Products shall furnish the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each type of traffic product supplied.

The following is the List of Approved Traffic Products:

#### PAVEMENT MARKERS, PERMANENT TYPE

##### RETROREFLECTIVE

Apex, Model 921 (100 mm x 100 mm)

Ray-O-Lite, Models SS (100 mm x 100 mm), RS (100 mm x 100 mm) and AA (100 mm x 100 mm)

Stimsonite, Models 88 (100 mm x 100 mm), 911 (100 mm x 100 mm), 953 (70 mm x 114 mm)

3M Series 290 (89 mm x 100 mm)

Contract No. «Dist»-«Contract\_No»



## RETROREFLECTIVE WITH ABRASION RESISTANT SURFACE (ARS)

Ray-O-Lite "AA" ARS (100 mm x 100 mm)  
Stimsonite, Models 911 (100 mm x 100 mm), 953 (70 mm x 114 mm)  
3M Series 290 (89 mm x 100 mm)

## RETROREFLECTIVE WITH ABRASION RESISTANT SURFACE (ARS)

(Used for recessed applications)

Stimsonite, Model 948 (58 mm x 119 mm)  
Ray-O-Lite, Model 2002 (58 mm x 117 mm)  
Stimsonite, Model 944SB (51 mm x 100 mm)\*  
Ray-O-Lite, Model 2004 ARS (51 mm x 100 mm)\*

\*For use only in 114 mm wide (older) recessed slots

## NON-REFLECTIVE FOR USE WITH EPOXY ADHESIVE, 100 mm Round

Apex Universal (Ceramic)  
Highway Ceramics, Inc. (Ceramic)

## NON-REFLECTIVE FOR USE WITH BITUMEN ADHESIVE, 100 mm Round

Apex Universal (Ceramic)  
Apex Universal, Model 929 (ABS)  
Elgin Molded Plastics, "Empco-Lite" Model 900 (ABS)  
Highway Ceramics, Inc. (Ceramic)  
Hi-Way Safety, Inc., Models P20-2000W and 2001Y (ABS)  
Interstate Sales, "Diamond Back" (ABS) and (Polypropylene)  
Alpine Products, D-Dot (ABS)  
Road Creations, Model RCB4NR (Acrylic)

## PAVEMENT MARKERS, TEMPORARY TYPE

### TEMPORARY MARKERS FOR LONG TERM DAY/NIGHT USE (6 months or less)

Apex Universal, Model 924 (100 mm x 100 mm)  
Davidson Plastics Corp., Model 3.0 (100 mm x 100 mm)  
Elgin Molded Plastics, "Empco-Lite" Model 901 (100 mm x 100 mm)  
Road Creations, Model R41C (100 mm x 100 mm)  
Vega Molded Products "Temporary Road Marker" (75 mm x 100 mm)

### TEMPORARY MARKERS FOR SHORT TERM DAY/NIGHT USE (14 days or less)

(For seal coat or chip seal applications, clear protective covers are required)

Apex Universal, Model 932  
Davidson Plastics, Models T.O.M., T.R.P.M., and "HH" (High Heat)  
Hi-Way Safety, Inc., Model 1280/1281

## STRIPING AND PAVEMENT MARKING MATERIALS

### PERMANENT TRAFFIC STRIPING AND PAVEMENT MARKING TAPE

Advanced Traffic Marking, Series 300 and 400  
Brite-Line, Series 1000  
Swarco Industries, "Director 35" (For transverse application only)  
Swarco Industries, "Director 60"  
3M, "Stamark" Series 380 and 5730

Contract No. «Dist»-«Contract\_No»

3M, "Stamark" Series A320 Bisymmetric (For use on low-volume roadways only)  
3M, "Stamark" Series A420, A440, N420, and N440 (For transverse application only)

**TEMPORARY (REMOVABLE) STRIPING AND PAVEMENT MARKING TAPE**  
(6 months or less)

Brite-Line, Series 100  
P.B. Laminations, Aztec, Grade 102  
Swarco Industries, "Director-2"  
3M, "Stamark," Series A620  
3M Series A145 Removable Black Line Mask  
(Black Tape: For use only on Asphalt Concrete Surfaces)  
Advanced Traffic Marking Black "Hide-A-Line"  
(Black Tape: For use only on Asphalt Concrete Surfaces)

**PREFORMED THERMOPLASTIC** (Heated in place)

Flint Trading, "Premark" and "Premark 20/20 Flex"  
Pavemark, "Hotape"

**REMOVABLE TRAFFIC PAINT**

Belpro, Series 250/252 and No. 93 Remover

**CLASS 1 DELINEATORS**

**ONE-PIECE DRIVEABLE FLEXIBLE TYPE, 1700 mm**

Carsonite, Curve-Flex CFRM-400  
Carsonite, Roadmarker CRM-375  
Davidson Plastics, "Flexi-Guide Models 400 and 566"  
FlexStake, Model 654TM  
GreenLine Models HWD1-66 and CGD1-66  
J. Miller Industries, Model JMI-375 (with soil anchor)

**SPECIAL USE FLEXIBLE TYPE, 1700 mm**

Carsonite, "Survivor" with 450 mm U-Channel base  
FlexStake, Model 604  
GreenLine Models HWD and CGD (with 450 mm U-Channel base)  
Safe-Hit with 200 mm pavement anchor (SH248-GP1)  
Safe-Hit with 380 mm soil anchor (SH248-GP2) and with 450 mm soil anchor (SH248-GP3)

**SURFACE MOUNT FLEXIBLE TYPE, 1200 mm**

Bent Manufacturing Company, "Masterflex" Model MF-180EX-48  
Carsonite, "Super Duck II"  
FlexStake, Surface Mount, Models 704 and 754TM

**CHANNELIZERS**

**SURFACE MOUNT TYPE, 900 mm**

Bent Manufacturing Company, "Masterflex" Models MF-360-36 (Round) and MF-180-36 (Flat)  
Carsonite, "Super Duck" (Flat SDF-436, Round SDR-336)  
Carsonite, Super Duck II Model SDCF203601MB "The Channelizer"  
Davidson Plastics, Flex-Guide Models FG300LD and FG300UR  
FlexStake, Surface Mount, Models 703 and 753TM  
GreenLine, Model SMD-36

Contract No. «Dist»-«Contract\_No»

The Line Connection, "Dura-Post" Model DP36-3 (Permanent)  
The Line Connection, "Dura-Post" Model DP36-3C (Temporary)  
Repo, Models 300 and 400  
Safe-Hit, Guide Post, Model SH236SMA

### **CONICAL DELINEATORS, 1070 mm**

(For 700 mm Traffic Cones, see Standard Specifications)

Bent Manufacturing Company "T-Top"  
Plastic Safety Systems "Navigator-42"  
Roadmaker Company "Stacker"  
Traffix Devices "Grabber"

### **OBJECT MARKERS**

TYPE "K", 450 mm

Carsonite, Model SMD-615  
FlexStake, Model 701KM  
Repo, Models 300 and 400  
Safe-Hit, Model SH718SMA  
The Line Connection, Model DP21-4K

TYPE "K-4", 450-600 mm  
(Shown as Type "Q" in the Traffic Manual)

Carsonite, Super Duck II  
FlexStake, Model 701KM  
Repo, Models 300 and 400  
Safe-Hit, Models SH8 24SMA\_WA and SH8 24GP3\_WA  
The Line Connection, Model DP21-4Q

### **TEMPORARY RAILING (TYPE K) REFLECTORS AND CONCRETE BARRIER MARKERS**

IMPACTABLE TYPE

ARTUK, "FB"  
Davidson Plastics, Model PCBM-12  
Duraflex Corp., "Flexx 2020" and "Electriflexx"

NON-IMPACTABLE TYPE

ARTUK, JD Series  
Stimsonite, Model 967 (with 83 mm Acrylic cube corner reflector)  
Stimsonite, Model 967LS  
Vega Molded Products, Models GBM and JD

### **THREE BEAM BARRIER MARKERS**

(For use to the left of traffic)

Duraflex Corp., "Railrider"  
Davidson Plastics, "Mini" (75 mm x 254 mm)

### **CONCRETE BARRIER DELINEATORS, 400 mm**

(For use to the right of traffic. When mounted on top of barrier, places top of reflective element at 1200 mm)

Davidson Plastics, Model PCBM T-16  
Safe-Hit, Model SH216RBM

**CONCRETE BARRIER-MOUNTED MINI-DRUM**  
(260 mm x 360 mm x 570 mm)

Stinson Equipment Company "SaddleMarker"

**SOUND WALL DELINEATOR**

(Applied to a vertical surface. Top of reflective element at 1200 mm)

Davidson Plastics, PCBM S-36

**GUARD RAILING DELINEATOR**

(Top of reflective element at 1200 mm above plane of roadway)

WOOD POST TYPE, 686 mm

Carsonite, Model 427  
Davidson Plastics FG 427 and FG 527  
FlexStake, Model 102 GR  
GreenLine GRD 27  
J.Miller Model JMI-375G  
Safe-Hit, Model SH227GRD

STEEL POST TYPE

Carsonite, Model CFGR-327 with CFGRBK300 Mounting Bracket

**RETROREFLECTIVE SHEETING FOR:**

CHANNELIZERS, BARRIER MARKERS, AND DELINEATORS

3M, High Intensity  
Reflexite, PC-1000 Metalized Polycarbonate  
Reflexite, AC-1000 Acrylic  
Reflexite, AP-1000 Metalized Polyester  
Reflexite, AR-1000 Abrasion Resistant Coating  
Stimsonite, Series 6200 (For rigid substrate devices only)

TRAFFIC CONES, 330 mm Sleeves

Reflexite SB (Polyester), Vinyl or "TR" (Semi-transparent)

TRAFFIC CONES, 100 mm and 150 mm Sleeves

3M Series 3840  
Reflexite Vinyl, "TR" (Semi-transparent) or "Conformalite"

BARRELS AND DRUMS

Reflexite, "Super High Intensity" or "High Impact Drum Sheeting"  
3M Series 3810

BARRICADES: Type I, Engineering Grade

American Decal, Adcolite  
Avery Dennison, 1500 and 1600  
3M, Scotchlite, Series CW

BARICADES: Type II, Super Engineering Grade

Avery Dennison, "Fasign" 2500 Series  
Kiwalite Type II  
Nikkalite 1800 Series

SIGNS: Type II, Super Engineering Grade

Avery Dennison, "Fasign" 2500 Series  
Kiwalite, Type II  
Nikkalite 1800 Series

SIGNS: Type III, High-Intensity Grade

3M Series 3800  
Nippon Carbide, Nikkalite Brand Ultralite Grade II

SIGNS: Type IV, High-Intensity Prismatic Grade

Stimsonite Series 6200

SIGNS: Type VII, High-Intensity Prismatic Grade

3M Series 3900

SIGNS: Type VI, Roll-Up Signs

Reflexite, Vinyl (Orange), Reflexite "SuperBright" (Fluorescent orange)  
3M Series RS34 (Orange) and RS20 (Fluorescent orange)

## **SIGN SUBSTRATE FOR CONSTRUCTION AREA SIGNS**

ALUMINUM

FIBERGLASS REINFORCED PLASTIC (FRP)

Sequentia, "Polyplate"  
Fiber-Brite

### **8-1.03 STATE-FURNISHED MATERIALS**

Attention is directed to Section 6-1.02, "State-Furnished Materials," of the Standard Specifications and these special provisions.

The following materials will be furnished to the Contractor:

Sign panels for roadside signs and overhead sign structures.

Hardware for mounting sign panels as follows:

1. Closure inserts.
2. Aluminum bolts and nuts and steel beveled washers for mounting laminated sign panels on overhead sign structures.

Incandescent lamps for flashing beacons and sign lighting fixtures.

Four Model 500 changeable message signs, wiring harnesses and controller assemblies, including controller unit and completely wired cabinets, will be furnished to the Contractor at the Caltrans Laboratories, 5900 Folsom Blvd., Sacramento, California.

Green non-reflective tape for pull box markers

Telecommunications equipment for interfacing the camera control receivers/drivers in the closed circuit television camera control cabinet to the Traffic Management Center (TMC).

Completely wired controller cabinets (with auxiliary equipment but without controller unit) will be furnished to the Contractor at the District 3 Signal Shop at 5900 Folsom Blvd., Sacramento, California.

#### **8-1.04 ASPHALT**

The first paragraph and tables following the first paragraph in Section 92-1.02, "Grades," of the Standard Specifications shall not apply.

The grade of asphalt to be used will be specified elsewhere in these special provisions. The safe transportation, storage, use and disposal of the asphalt specified shall be the responsibility of the Contractor.

A Certificate of Compliance, as provided in Section 92-1.03, "Test Report," of the Standard Specifications shall accompany each shipment of asphalt to the work. When PBA Grade 6a, 6b or 7 is specified, the Certificate of Compliance shall include actual results of tests completed by the producer in addition to the items enumerated in Section 92-1.03, "Test Report," of the Standard Specifications. The Certificate of Compliance shall verify that the results of AASHTO Test Method T240 (Mass Loss after Rolling Thin Film Oven Test) indicate a maximum mass loss of 0.6 percent and that AASHTO Test Method T48 (Flash Point, Cleveland Open Cup) indicate a minimum flash point of 232°C. The actual formulation used by the asphalt producer shall be available to the Department upon written request. The Department will execute a non-disclosure agreement if requested by the asphalt producer.

For PBA Grades 6a, 6b or 7, if the results of mass loss after Rolling Thin Film Oven Test (AASHTO Test Method T240) or Flash Point, Cleveland Open Cup (AASHTO Test Method T48) shown on the Certificate of Compliance are not within the limits specified in the table entitled "PERFORMANCE BASED ASPHALT BINDER GRADES" or if the results are not shown on the Certificate of Compliance, the individual shipment of asphalt will be rejected. Rejected asphalt shall not be used on the project. Should rejected asphalt be unloaded into bulk storage tanks, asphalt from the tanks shall not be used on the project until tests and Certificate of Compliance are furnished for the material and indicate compliance with the specifications.

Asphalt to be used as a binder for asphalt concrete will be sampled using the sampling device specified in Section 39-3.01C, "Asphalt Binder Storage," of the Standard Specifications. Two samples per operating day, each consisting of 2 one-liter containers, will be taken from the bulk storage tank feeder line.

For PBA Grades 6a, 6b or 7, if the test result of samples taken from the bulk storage tank, indicate mass loss greater than 0.6 percent, the material containing the paving asphalt represented by the tests shall be removed. However, if requested in writing by the Contractor and approved by the Engineer, the material containing the paving asphalt with mass loss greater than 0.6 percent may remain in place, and the Contractor shall pay to the State the amount calculated by the formulae listed below.

For mass loss test results over 0.6 percent but less than or equal to 1.0 percent:

(25 percent multiplied by 25 tonne average multiplied by the invoice price of paving asphalt)

For mass loss test results over 1.0 percent:

(100 percent multiplied by 25 tonne average multiplied by the invoice price of paving asphalt)

The Department may deduct this amount from any moneys due, or that may become due, the Contractor under the contract. Each sample from the bulk storage shall represent 25 tonne average. The delivered price of the paving asphalt shall be based on a certified invoice provided by the Contractor.

**PERFORMANCE BASED ASPHALT BINDER GRADES**

Specification Designation	AASHTO Test Method	PBA Grade				
		1	4	6a	6b	7
Penetration (25°C, 100g, 5s) dmm, RTFO Aged Residue, Min (Note 1)	T49	25	20	—	----	----
Absolute Viscosity (60°C), Pa•s(x10 <sup>-1</sup> ) (Note 2) Original Binder, Min RTFO Aged Residue	T202 T202	800 2500-5000 (Note 3)	2800 14 000 Max	2000 5000 Min	2000 5000 Min	1100 3000 Min
Kinematic Viscosity (135°C), m <sup>2</sup> /s(x10 <sup>-6</sup> ) Original Binder, Max. RTFO Aged Residue, Min	T201 T201	---- 275	---- 350	2000 275	2000 275	2000 275
Absolute Viscosity Ratio (60°C), Max RTFO Visc./Orig. Visc.	-----	4.0	4.0	4.0	4.0	4.0
Flash Point, Cleveland Open Cup, °C, (Note 4) Original Binder, Min	T48	232	232	232	232	232
Mass Loss After RTFO Test, % (Note 5)	T240	Report (Note 6)	Report	0.60	0.60	0.60
Solubility in Trichloroethylene, % Original Binder, Min	T44	99.0	99.0	Report	Report	Report
Ductility (25°C, 5 cm/min), cm RTFO Aged Residue, Min	T51	75	50	60	60	75
On Residue from Pav @: or Residue from Tilt Oven @ 113° C for: (hours)	PP1  (Note 7)	90°C  18	100°C  36	100°C  36	100°C  36	110°C  72
SSD -115(SSV)-50.6	(Note 9)	-----	-----	-----	-----	25°C
Stiffness, 300 MPa, Max. @: and M-value, 0.30, Min.	TP1	-6°C	-6°C	-24°C	-30°C	-6°C

1. "RTFO Aged Residue" means the asphaltic residue obtained using the Rolling Thin Film Oven Test ("RTFO Test"), AASHTO Test Method T240 or ASTM Designation: D 2827.
2. The Absolute Viscosity (60°C) of PBA 6a, 6b, and 7 will be determined at 1 sec-1 using ASTM Designation:D 4957 with Asphalt Institute Vacuum Capillary Viscometers.
3. Where actual limits (e.g. 2500-5000) are indicated, the actual test results shall be part of the certified copy of test results, or shall be furnished with the Certificate of Compliance.
4. Actual results of the test shall be part of the certified copy of test results and when PBA Grade 6a, 6b or 7 is used an additional statement verifying an acceptable flash point shall be included with the Certificate of Compliance.
5. Actual results of the test shall be part of the certified copy of test results and when PBA Grade 6a, 6b or 7 is used an additional statement verifying an acceptable mass loss shall be included with the Certificate of Compliance.
6. Where "Report" is indicated, there is no requirement, however the actual results of the test shall be part of the certified copy of test results, or shall be furnished with the Certificate of Compliance.
7. "Tilt Oven Residue" means the asphalt obtained using California Test 374, Method B, "Method for Determining Asphalt Durability Using the California Tilt-Oven Durability Test".
8. SSD = Shear susceptibility of Delta, SSV = Shear susceptibility of Viscosity.
9. California Test 381.

### 8-1.05 MEASUREMENT OF QUANTITIES

Attention is directed to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications and these special provisions.

The following is added after the third paragraph in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications:

All elements of the material plant controller which affect the accuracy or delivery of data shall be made available for the application of security seals. These devices will be inspected and adjusting elements sealed prior to the first production of materials for the contract. The security seals will be furnished by the Engineer. Material production shall cease when alteration, disconnection, or otherwise manipulation of the security seals occur and production shall not resume until the device is inspected and resealed by the Engineer.

### 8-1.06 ENGINEERING FABRICS

Engineering fabrics shall conform to the requirements in Section 88, "Engineering Fabrics," of the Standard Specifications and these special provisions.

Filter fabric for this project shall be ultraviolet ray (UV) protected.

Nonwoven and woven rock slope protection fabric shall conform to the following additional requirement:

Specification	ASTM Designation	Requirement
Permittivity, 1/second, Minimum	D 4491	0.5

## SECTION 8-2. CONCRETE

### 8-2.01 PORTLAND CEMENT CONCRETE

Portland cement concrete shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

Unless the use of mineral admixture is prohibited, whenever the word "cement" is found in the Standard Specifications or the special provisions, it shall be understood to mean "cementitious material" when both of the following conditions are met:

- A. The cement content of portland cement concrete is specified, and
- B. Section 90, "Portland Cement Concrete," of the Standard Specifications is referenced.

Portland cement concrete that is produced using equipment where the cement and mineral admixture are proportioned in the same weigh hopper shall be sampled and tested by the Contractor, in the presence of the Engineer, for mix uniformity in conformance with the requirements of ASTM Designation: C 94 Section 11, "Mixing and Delivery," and "Annex A1." The testing shall be performed on concrete produced using an approved project mix design and may be done at the project concrete placement site.

The batch plant producing the portland cement concrete for the project shall have met the requirements of California Test 109 within one year prior to producing concrete for the project.

Sampling for mix uniformity tests shall be performed the first time portland cement concrete, of sufficient volume to perform these tests, is placed on the project. All test results shall be presented to the Engineer no later than 10 days after completion of sampling.

Test results from mixer uniformity testing will not be used for contract compliance, acceptance, or payment.

Prior to placing any concrete on the project, the Contractor shall supply a list of all portland cement concrete mixers to be used. When truck mixers are to be used, the list shall contain the truck identification number, mixer brand, mixer age and mixer condition.

When truck mixers are used, the mix uniformity testing shall be performed on 5 truck mixers per project. The truck mixers selected for testing shall be representative of the different mixer brands, ages, and conditions of the mixers on the list and approved by the Engineer. Mixer selection shall be completed before mix uniformity testing is started. Sampling for the mix uniformity tests from each of the 5 mixers shall be completed within the same work shift, unless otherwise approved in writing by the Engineer. The Contractor shall notify the Engineer, in writing, a minimum of 24 hours prior to performing the sampling for these tests. The letter of notification shall include 1) the truck mixer information, 2) the specific gravity of the coarse aggregate in the mix to be tested, and 3) a copy of the current ACI "Concrete Field Testing Technician, Grade 1" certification for each tester who will perform testing for the Contractor. The Contractor shall provide an adequate number of testers to successfully perform the testing with a minimum amount of impact to the Contractor's operations.

When concrete is completely mixed in stationary mixers, each mixer used for the project shall be tested one time.



Full compensation for the testing of mix uniformity as specified herein will be considered as included in the contract price paid for the concrete work involved and no additional compensation will be allowed therefor.

Unless otherwise specified, Type C accelerating chemical admixture conforming to the requirements of ASTM Designation: C 494, may be used in portland cement concrete for precast steam cured concrete members.

Section 90-1.01, "Description," of the Standard Specifications is amended to read:

**90-1.01 Description.**—Portland cement concrete shall be composed of cementitious material, fine aggregate, coarse aggregate, admixtures if used, and water, proportioned and mixed as specified in these specifications.

Unless otherwise specified, cementitious material to be used in portland cement concrete shall conform to the requirements for cement and mineral admixtures in Section 90-2, "Materials" and shall be either: 1) "Type IP (MS) Modified" cement; or 2) a combination of "Type II Modified" portland cement and mineral admixture.

Concrete for each portion of the work shall comply with the requirements for the Class, cementitious material content in kilograms per cubic meter, 28-day compressive strength, minor concrete, or commercial quality concrete, as shown on the plans or specified in these specifications or the special provisions.

Class 1 concrete shall contain not less than 400 kg of cementitious material per cubic meter.

Class 2 concrete shall contain not less than 350 kg of cementitious material per cubic meter.

Class 3 concrete shall contain not less than 300 kg of cementitious material per cubic meter.

Class 4 concrete shall contain not less than 250 kg of cementitious material per cubic meter.

Minor concrete shall contain not less than 325 kg of cementitious material per cubic meter unless otherwise specified in these specifications or the special provisions.

Unless otherwise designated on the plans or specified in these specifications or the special provisions, the amount of cementitious material used per cubic meter of concrete in structures or portions of structures shall conform to the following:

Use	Cementitious Material Content (kg/m <sup>3</sup> )
Concrete which is designated by compressive strength:	
Deck slabs and slab spans of bridges	400 min., 475 max.
Roof sections of exposed top box culverts	400 min., 475 max.
Other portions of structures	350 min., 475 max.
Concrete not designated by compressive strength:	
Deck slabs and slab spans of bridges	400 min.
Roof sections of exposed top box culverts	400 min.
Prestressed members	400 min.
Seal courses	400 min.
Other portions of structures	350 min.
Concrete for precast members	350 min., 550 max.

Whenever the 28-day compressive strength shown on the plans is greater than 25 MPa, the concrete shall be considered to be designated by compressive strength. If the plans show a 28-day compressive strength which is 31 MPa or greater, an additional 7 days will be allowed to obtain the specified strength. The 28-day compressive strengths shown on the plans which are 25 MPa or less, are shown for design information only and are not to be considered a requirement for acceptance of the concrete.

Concrete designated by compressive strength shall be proportioned such that the concrete will conform to the strength shown on the plans or specified in the special provisions.

The Contractor shall determine the mix proportions for all concrete except pavement concrete. The Engineer will determine the mix proportions for pavement concrete.

Before using concrete for which the mix proportions have been determined by the Contractor, or in advance of revising those mix proportions, the Contractor shall submit in writing to the Engineer a copy of the mix design.

Compliance with cementitious material content requirements will be verified in conformance with procedures described in California Test 518 for cement content. For testing purposes, mineral admixture shall be considered to be cement. Batch proportions shall be adjusted as necessary to produce concrete having the specified cementitious material content.

If any concrete used in the work has a cementitious material content, consisting of cement, mineral admixture, or cement plus mineral admixture, which is less than the minimum required for the work, the concrete shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place and the

Contractor shall pay to the State \$0.55 for each kilogram of cement, mineral admixture, or cement plus mineral admixture which is less than the minimum required for the work. The Department may deduct the amount from any monies due, or that may become due, the Contractor under the contract. The deductions will not be made unless the difference between the contents required and those actually provided exceeds the batching tolerances permitted by Section 90-5, "Proportioning." No deductions for cementitious material content will be made based on the results of California Test 518.

The requirements of the preceding paragraph shall not apply to minor concrete nor commercial quality concrete.

All concrete for which the mix proportions are determined either by the Contractor or the Engineer shall conform to the requirements of this Section 90.

The first paragraph in Section 90-2.01, "Portland Cement," of the Standard Specifications is amended to read:

**90-2.01 Portland Cement.**—Unless otherwise specified, portland cement shall be either "Type IP (MS) Modified" cement or "Type II Modified" portland cement.

"Type IP (MS) Modified" cement shall conform to the specifications for Type IP (MS) cement in ASTM Designation: C 595, and shall be comprised of an intimate mixture of Type II cement and not more than 25 percent of a mineral admixture. The type and minimum amount of mineral admixture used in the manufacture of "Type IP (MS) Modified" cement shall be in conformance with the provisions of Section 90-4.08, "Required Use of Mineral Admixtures."

"Type II Modified" portland cement shall conform to the specifications for Type II portland cement in ASTM Designation: C 150.

In addition, "Type IP (MS) Modified" cement and "Type II Modified" portland cement shall conform to the following requirements:

- A. The cement shall not contain more than 0.60 percent by mass of alkalis, calculated as the percentage of Na<sub>2</sub>O plus 0.658 times the percentage of K<sub>2</sub>O, when determined by either direct intensity flame photometry or by the atomic absorption method. The instrument and procedure used shall be qualified as to precision and accuracy in conformance with the requirements of ASTM Designation: C 114.
- B. The autoclave expansion shall not exceed 0.50 percent.
- C. Mortar, containing the cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not expand in water more than 0.010 percent and shall not contract in air more than 0.048 percent except that when cement is to be used for precast prestressed concrete piling, precast prestressed concrete members or steam cured concrete products, the mortar shall not contract in air more than 0.053 percent.

The second paragraph in Section 90-2.01, "Portland Cement," of the Standard Specifications is amended to read:

Type III and Type V portland cements shall conform to the specifications in ASTM Designation: C 150, and the additional requirements listed above for Type II Modified portland cement, except that when tested in conformance with California Test 527, mortar containing Type III portland cement shall not contract in air more than 0.075 percent.

The third paragraph in Section 90-2.01, "Portland Cement," of the Standard Specifications is deleted.

The twelfth paragraph in Section 90-2.02, "Aggregates," of the Standard Specifications is deleted.

The first paragraph in Section 90-2.03, "Water," of the Standard Specifications is amended to read:

**90-2.03 Water.**—In conventionally reinforced concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 1,000 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO<sub>4</sub>. In prestressed concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 650 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO<sub>4</sub>. In no case shall the water contain an amount of impurities that will cause either: 1) a change in the setting time of cement of more than 25 percent when tested in conformance with ASTM Designation: C 191 or ASTM Designation: C 266; or 2) a reduction in the compressive strength of mortar at 14 days of more than 5 percent, when tested in conformance with ASTM Designation: C 109, when compared to the results obtained with distilled water or deionized water, tested in conformance with ASTM Designation: C 109.

The following section is added to Section 90-2, "Materials," of the Standard Specifications:

**90-2.04 Admixture Materials.**—Admixture materials shall conform to the requirements of the ASTM Designations shown below:

Chemical Admixtures—ASTM Designation: C 494.

Air-entraining Admixtures—ASTM Designation: C 260.

Calcium Chloride—ASTM Designation: D 98.

Mineral Admixtures—Coal fly ash, raw or calcined natural pozzolan as specified in ASTM Designation: C 618, except that the loss on ignition shall not exceed 4 percent, or, silica fume as specified in ASTM Designation: C 1240, with reduction of mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.

Mineral admixtures shall be used in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures."

Section 90-4.02, "Materials," of the Standard Specifications is amended to read:

**90-4.02 Materials.**—Admixture materials shall be as specified in Section 90-2.04, "Admixture Materials."

Section 90-4.05, "Optional Use of Chemical Admixtures," of the Standard Specifications is amended to read:

**90-4.05 Optional Use of Chemical Admixtures.**—The Contractor will be permitted to use Type A or F, water-reducing; Type B, retarding; or Type D or G, water-reducing and retarding admixtures as described in ASTM Designation: C 494 to conserve cementitious material or to facilitate any concrete construction application subject to the following conditions:

When a water-reducing admixture or a water-reducing and retarding admixture is used, the cementitious material content specified or ordered may be reduced by a maximum of 5 percent by mass except that the resultant cementitious material content shall be not less than 300 kilograms per cubic meter.

When a reduction in cementitious material content is made, the dosage of admixture used shall be the dosage used in determining approval of the admixture.

Section 90-4.07, "Optional Use of Air-entraining Admixtures," of the Standard Specifications is amended to read:

**90-4.07 Optional Use of Air-entraining Admixtures.**—When air-entrainment has not been specified or ordered by the Engineer, the Contractor will be permitted to use an air-entraining admixture to facilitate the use of any construction procedure or equipment provided that the average air content, as determined by California Test 504, of 3 successive tests does not exceed 4 percent and no single test value exceeds 5.5 percent. If the Contractor elects to use an air-entraining admixture in concrete for pavement, the Contractor shall so indicate at the time the Contractor designates the source of aggregate as provided in Section 40-1.015, "Cement Content."

Section 90-4.08, "Required Use of Mineral Admixtures," of the Standard Specifications is amended to read:

**90-4.08 Required Use of Mineral Admixtures.**—Unless otherwise specified, mineral admixture shall be combined with cement to make cementitious material for use in portland cement concrete.

The calcium oxide content of mineral admixtures shall not exceed 10 percent and the available alkali, as sodium oxide equivalent, shall not exceed 1.5 percent when measured in conformance with the requirements of ASTM Designation: C 618.

The amounts of cement and mineral admixture used in cementitious material for portland cement concrete shall be sufficient to satisfy the minimum cementitious material content requirements specified in Section 90-1.01, "Description," or Section 90-4.05, "Optional Use of Chemical Admixtures," and shall conform to the following:

The minimum amount of cement shall not be less than 75 percent by mass of the specified minimum cementitious material content.

The minimum amount of mineral admixture to be combined with cement shall be determined using one of the following criteria:

- A. When the calcium oxide content of a mineral admixture, measured in conformance with the requirements of ASTM Designation: C 618 and Section 90-2.04, "Admixture Materials," is equal to or less than 2 percent by mass, the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix.
- B. When the calcium oxide content of a mineral admixture, measured in conformance with the requirements of ASTM Designation: C 618 and Section 90-2.04, "Admixture Materials," is greater than 2 percent, the amount of mineral admixture shall not be less than 25 percent by mass of the total amount of cementitious material to be used in the mix.
- C. When a mineral admixture is used, which conforms to the requirements for silica fume in Section 90-2.04, "Admixture Materials," is used, the amount of mineral admixture shall not be less than 10 percent by mass of the total amount of cementitious material to be used in the mix.

If more than the required amount of cementitious material is used, the additional cementitious material in the mix may be either cement, any mineral admixture conforming to the requirements of Section 90-2.04, "Admixture Materials," or a combination of both; however, the maximum total amount of mineral admixture shall not exceed 35 percent by mass of the total amount of cementitious material to be used in the mix. Where Section 90-1.01, "Description," specifies a maximum cementitious content in kilograms per cubic meter, the total mass of cement and mineral admixture per cubic meter shall not exceed the specified maximum cementitious material content.

Section 90-4.09, "Optional Use of Mineral Admixture," of the Standard Specifications is deleted.

Section 90-4.11, "Storage, Proportioning, and Dispensing of Mineral Admixtures," of the Standard Specifications is amended to read:

**90-4.11 Storage, Proportioning, and Dispensing of Mineral Admixtures.**—Mineral admixtures shall be protected from exposure to moisture until used. Sacked material shall be piled to permit access for tally, inspection and identification for each shipment.

Adequate facilities shall be provided to assure that mineral admixtures meeting the specified requirements are kept separate from other mineral admixtures in order to prevent any but the specified mineral admixtures from entering the work. Safe and suitable facilities for sampling mineral admixtures shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper.

Mineral admixtures shall be incorporated into concrete using equipment conforming to the requirements for cement weigh hoppers, and charging and discharging mechanisms in ASTM Designation: C 94, in Section 90-5.03, "Proportioning," and in this Section 90-4.11.

When interlocks are required for cement and mineral admixture charging mechanisms by Section 90-5.03A, "Proportioning for Pavement," and cement and mineral admixtures are weighed cumulatively, their charging mechanisms shall be interlocked to prevent the introduction of mineral admixture until the mass of cement in the cement weigh hopper is within the tolerances specified in Section 90-5.02, "Proportioning Devices."

Mineral admixture used in concrete for exposed surfaces of like elements of a structure shall be from the same source and of the same percentage.

Section 90-5.02, "Proportioning Devices," of the Standard Specifications is amended to read:

**90-5.02 Proportioning Devices.**—All weighing, measuring or metering devices used for proportioning materials shall conform to the requirements in Section 9-1.01, "Measurement of Quantities," and this Section 90-5.02. In addition, any automatic weighing systems used shall comply with the requirements for automatic proportioning devices in Section 90-5.03A, "Proportioning for Pavement." These automatic devices shall be automatic to the extent that the only manual operation required for proportioning the aggregates, cement, and mineral admixture for one batch of concrete is a single operation of a switch or starter.

Proportioning devices shall be tested at the expense of the Contractor as frequently as the Engineer may deem necessary to insure their accuracy.

Weighing equipment shall be insulated against vibration or movement of other operating equipment in the plant. When the plant is in operation, the mass of each batch of material shall not vary from the mass designated by the Engineer by more than the tolerances specified herein.

Equipment for cumulative weighing of aggregate shall have a zero tolerance of  $\pm 0.5$  percent of the designated total batch mass of the aggregate. For systems with individual weigh hoppers for the various sizes of aggregate, the zero tolerance shall be  $\pm 0.5$  percent of the individual batch mass designated for each size of aggregate. Equipment for cumulative weighing of cement and mineral admixtures shall have a zero tolerance of  $\pm 0.5$  percent of the designated total batch mass of the cement and mineral admixture. Equipment for weighing cement or mineral admixture separately

shall have a zero tolerance of  $\pm 0.5$  percent of their designated individual batch masses. Equipment for measuring water shall have a zero tolerance of  $\pm 0.5$  percent of its designated mass or volume.

The mass indicated for any batch of material shall not vary from the preselected scale setting by more than the following:

- A. Aggregate weighed cumulatively shall be within 1.0 percent of the designated total batch mass of the aggregate. Aggregates weighed individually shall be within 1.5 percent of their respective designated batch masses.
- B. Cement shall be within 1.0 percent of its designated batch mass. When weighed individually, mineral admixture shall be within 1.0 percent of its designated batch mass. When mineral admixture and cement are permitted to be weighed cumulatively, cement shall be weighed first to within 1.0 percent of its designated batch mass, and the total for cement and mineral admixture shall be within 1.0 percent of the sum of their designated batch masses.
- C. Water shall be within 1.5 percent of its designated mass or volume.

Each scale graduation shall be approximately 0.001 of the total capacity of the scale. The capacity of scales for weighing cement, mineral admixture, or cement plus mineral admixture and aggregates shall not exceed that of commercially available scales having single graduations indicating a mass not exceeding the maximum permissible mass variation above, except that no scale shall be required having a capacity of less than 500 kg, with 0.5 kg graduations.

Section 90-5.03, "Proportioning," excluding Section 90-5.03A, "Proportioning for Pavement," of the Standard Specifications is amended to read:

**90-5.03 Proportioning.**—Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cement, mineral admixture and water as provided in these specifications. Aggregates shall be proportioned by mass.

At the time of batching, all aggregates shall have been dried or drained sufficiently to result in a stable moisture content such that no visible separation of water from aggregate will take place during transportation from the proportioning plant to the point of mixing. In no event shall the free moisture content of the fine aggregate at the time of batching exceed 8 percent of its saturated, surface-dry mass.

Should separate supplies of aggregate material of the same size group, but of different moisture content or specific gravity or surface characteristics affecting workability, be available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting upon another.

Bulk "Type IP (MS) Modified" cement, that conforms to the requirements in Section 90-2.01, "Portland Cement," shall be weighed in an individual hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer.

Bulk cement to be blended with mineral admixture for use in portland cement concrete for pavement and structures may be weighed in separate, individual weigh hoppers or may be weighed in the same weigh hopper with mineral admixture and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer. If the cement and mineral admixture are weighed cumulatively, the cement shall be weighed first.

When cement and mineral admixtures are weighed in separate weigh hoppers, the weigh systems for the proportioning of the aggregate, the cement, and the mineral admixture shall be individual and distinct from all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and an indicator to constitute an individual and independent material weighing device. The cement and the mineral admixture shall be discharged into the mixer simultaneously with the aggregate.

The scale and weigh hopper for bulk weighing cement, mineral admixture, and cement plus mineral admixture shall be separate and distinct from the aggregate weighing equipment.

When the source of any aggregate is changed for concrete structures, the Contractor shall adjust the mix proportions and submit in writing to the Engineer a copy of the mix design before using such aggregates. When the source of any aggregate is changed for other concrete, the Engineer shall be allowed sufficient time to adjust the mix and such aggregates shall not be used until necessary adjustments are made.

For all batches with a volume of one cubic meter or more, the batching equipment shall conform to one of the following combinations:

- A. Separate boxes and separate scale and indicator for weighing each size of aggregate.
- B. Single box and scale indicator for all aggregates.
- C. Single box or separate boxes and automatic weighing mechanism for all aggregates.

In order to check the accuracy of batch masses, the gross mass and tare mass of batch trucks, truck mixers, truck agitators, and non-agitating hauling equipment shall be determined when ordered by the Engineer. The equipment shall be weighed at the Contractor's expense on scales designated by the Engineer.

Section 90-5.03A, "Proportioning for Pavement," of the Standard Specifications is amended to read:

**90-5.03A Proportioning for Pavement.**—Aggregates and bulk cement, mineral admixture, and cement plus mineral admixture for use in pavement shall be proportioned by mass by means of automatic proportioning devices of approved type conforming to the requirements specified in this Section 90-5.03A.

The Contractor shall install and maintain in operating condition an electrically actuated moisture meter that will indicate, on a readily visible scale, changes in the moisture content of the fine aggregate as it is batched within a sensitivity of 0.5 percent by mass of the fine aggregate.

The batching of cement, mineral admixture, or cement plus mineral admixture and aggregate shall be interlocked so that a new batch cannot be started until all weigh hoppers are empty, the proportioning devices are within zero tolerance, and the discharge gates are closed. The interlock shall permit no part of the batch to be discharged until all aggregate hoppers and the cement and mineral admixture hoppers or the cement plus mineral admixture hopper are charged with masses which are within the tolerances specified in Section 90-5.02, "Proportioning Devices."

The discharge gate on the cement and mineral admixture hoppers or the cement plus mineral admixture hopper shall be designed to permit regulating the flow of cement, mineral admixture, or cement plus mineral admixture into the aggregate as directed by the Engineer.

When separate weigh boxes are used for each size of aggregate, the discharge gates shall permit regulating the flow of each size of aggregate as directed by the Engineer.

Material discharged from the several bins shall be controlled by gates or by mechanical conveyors. The means of withdrawal from the several bins, and of discharge from the weigh box, shall be interlocked so that not more than one bin can discharge at a time, and that the weigh box cannot be tripped until the required quantity from each of the several bins has been deposited therein. Should a separate weigh box be used for each size of aggregate, all may be operated and discharged simultaneously.

When the discharge from the several bins is controlled by gates, each gate shall be actuated automatically so that the required mass is discharged into the weigh box, after which the gate shall automatically close and lock.

The automatic weighing system shall be designed so that all proportions required may be set on the weighing controller at the same time.

The third paragraph in Section 90-6.01, "General," of the Standard Specifications is amended to read:

All concrete shall be homogeneous and thoroughly mixed, and there shall be no lumps or evidence of undispersed cement, mineral admixture, or cement plus mineral admixture.

The third and fourth paragraphs in Section 90-6.02, "Machine Mixing," of the Standard Specifications are amended to read:

The batch shall be so charged into the mixer that some water will enter in advance of cementitious materials and aggregates. All water shall be in the drum by the end of the first one-fourth of the specified mixing time.

Cementitious materials shall be batched and charged into the mixer by means that will not result either in loss of cementitious materials due to the effect of wind, or in accumulation of cementitious materials on surfaces of conveyors or hoppers, or in other conditions which reduce or vary the required quantity of cementitious material in the concrete mixture.

The sixth paragraph in Section 90-6.02, "Machine Mixing," of the Standard Specifications is amended to read:

The total elapsed time between the intermingling of damp aggregates and all cementitious materials and the start of mixing shall not exceed 30 minutes.

The seventh through tenth paragraphs in Section 90-6.03, "Transporting Mixed Concrete," of the Standard Specifications are amended to read:

When a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be completed within 1.5 hours, or before 250 revolutions of the drum or blades, whichever comes first, after the introduction of the

cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30° C, or above, a time less than 1.5 hours may be required.

When non-agitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be completed within one hour after the addition of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30° C, or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.

Each load of concrete delivered at the jobsite shall be accompanied by a weight certificate showing the mix identification number, non-repeating load number, date and time at which the materials were batched, the total amount of water added to the load and for transit-mixed concrete, the reading of the revolution counter at the time the truck mixer is charged with cement. This weight certificate shall also show the actual scale masses (kilograms) for the ingredients batched. Theoretical or target batch masses shall not be used as a substitute for actual scale masses.

Weight certificates shall be provided in printed form, or if approved by the Engineer, the data may be submitted in electronic media. Electronic media shall be presented in a tab-delimited format on 90 mm diskette with a capacity of at least 1.4 megabytes. Captured data, for the ingredients represented by each batch shall be LFCR (one line, separate record) with allowances for sufficient fields to satisfy the amount of data required by these specifications.

The Contractor may furnish a weight certificate that is accompanied by a separate certificate which lists the actual batch masses or measurements for a load of concrete provided that both certificates are 1) imprinted with the same non-repeating load number that is unique to the contract and 2) delivered to the jobsite with the load.

All weight certificates furnished by the Contractor shall conform to the requirements of Section 9-1.01, "Measurement of Quantities."

Section 90-6.05, "Hand-Mixing," of the Standard Specifications is amended to read:

**90-6.05 Hand-Mixing.**—Hand-mixed concrete shall be made in batches not more than one-fourth cubic meter and shall be mixed on a watertight, level platform. The proper amount of coarse aggregate shall be measured in measuring boxes and spread on the platform and the fine aggregate shall be spread on this layer, the 2 layers being not more than 0.3 meters in total depth. On this mixture shall be spread the dry cement and mineral admixture and the whole mass turned no fewer than 2 times dry; then sufficient clean water shall be added, evenly distributed, and the whole mass again turned no fewer than 3 times, not including placing in the carriers or forms.

The table in the first paragraph in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications is amended to read:

Type of Work	Nominal Penetration (mm)	Maximum Penetration (mm)
Concrete pavement	0-25	40
Non-reinforced concrete facilities	0-35	50
Reinforced concrete structures:		
Sections over 300 mm thick	0-35	65
Sections 300 mm thick or less	0-50	75
Concrete placed under water	75-100	115
Cast-in-place concrete piles	65-90	100

The first paragraph following the table of penetration ranges in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications is amended to read:

The amount of free water used in concrete shall not exceed 183 kg/m<sup>3</sup>, plus 20 kg for each required 100 kg of cementitious material in excess of 325 kg/m<sup>3</sup>.

The fourth paragraph in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications is amended to read:

Where there are adverse or difficult conditions which affect the placing of concrete, the above specified penetration and free water content limitations may be exceeded providing the Contractor is granted permission by the Engineer in writing to increase the cementitious material content per cubic meter of concrete. The increase in water and cementitious material shall be at a ratio not to exceed 30 kg of water per added 100 kg of cementitious material per cubic meter. The cost of additional cementitious material and water added under these conditions shall be at the Contractor's expense and no additional compensation will be allowed therefor.

Section 90-9.01, "General," of the Standard Specifications is amended to read:

**90-9.01 General.**—Concrete compressive strength requirements consist of a minimum strength which must be attained before various loads or stresses are applied to the concrete and, for concrete designated by strength, a minimum strength at the age of 28 days or at the age otherwise allowed in Section 90-1.01, "Description." The various strengths required are specified elsewhere or are shown on the plans.

The compressive strength of concrete will be determined from test cylinders which have been fabricated from concrete sampled in conformance with California Test 539. Test cylinders will be molded and initial field cured in conformance with California Test 540. Test cylinders will be cured and tested after receipt at the testing laboratory in conformance with California Test 521. A strength test shall consist of the average strength of 2 cylinders fabricated from material taken from a single load of concrete, except that, if any cylinder should show evidence of improper sampling, molding, or testing, that cylinder shall be discarded and the strength test shall consist of the strength of the remaining cylinder.

When concrete compressive strength is specified as a prerequisite to applying loads or stresses to a concrete structure or member, test cylinders for other than steam cured concrete will be cured in conformance with Method 1 of California Test 540. The compressive strength of concrete determined for these purposes will be evaluated on the basis of individual tests.

When concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete strength to be used as a basis for acceptance of other than steam cured concrete will be determined from cylinders cured in conformance with Method 1 of California Test 540. If the result of a single compressive strength test at the maximum age specified or allowed is below the specified strength but is 95 percent or more of the specified strength, the Contractor shall, at the Contractor's expense, make corrective changes, subject to approval of the Engineer, in the mix proportions or in the concrete fabrication procedures, before placing additional concrete, and shall pay to the State \$14.00 for each in-place cubic meter of concrete represented by the deficient test. If the result of a single compressive strength test at the maximum age specified or allowed is below 95 percent of the specified strength, but is 85 percent or more of the specified strength, the Contractor shall make the corrective changes specified above, and shall pay to the State \$20.00 for each in place cubic meter of concrete represented by the deficient test. In addition, such corrective changes shall be made when the compressive strength of concrete tested at 7 days indicates, in the judgment of the Engineer, that the concrete will not attain the required compressive strength at the maximum age specified or allowed. All concrete represented by a single test which indicates a compressive strength of less than 85 percent of the specified 28-day compressive strength will be rejected in conformance with the provisions in Section 6-1.04, "Defective Materials."

If the test result indicates that the compressive strength at the maximum curing age specified or allowed is below the specified strength, but 85 percent or more of the specified strength, payments to the State as required above shall be made, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength of the concrete placed in the work meets or exceeds the specified 28-day compressive strength. If the test result indicates a compressive strength at the maximum curing age specified or allowed below 85 percent, the concrete represented by that test will be rejected, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength and quality of the concrete placed in the work are acceptable. If the evidence consists of tests made on cores taken from the work, the cores shall be obtained and tested in conformance with the specifications of ASTM Designation: C 42.

No single compressive strength test shall represent more than 250 cubic meters.

When a precast concrete member is steam cured, the compressive strength of the concrete will be determined from test cylinders which have been handled and stored in conformance with Method 3 of California Test 540. The compressive strength of steam cured concrete will be evaluated on the basis of individual tests representing specific portions of production. When the concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete shall be considered to be acceptable whenever its compressive strength reaches the specified 28-day compressive strength provided that strength is reached in not more than the maximum number of days specified or allowed after the member is cast.

When concrete is specified by compressive strength, prequalification of materials, mix proportions, mixing equipment, and procedures proposed for use, will be required prior to placement of the concrete. Prequalification shall be accomplished by the submission of acceptable certified test data or trial batch reports by the Contractor. Prequalification data shall be based on the use of materials, mix proportions, mixing equipment, procedures, and size of batch proposed for use in the work.

Certified test data, in order to be acceptable, must indicate that not less than 90 percent of at least 20 consecutive tests exceed the specified strength at the maximum number of cure days specified or allowed, and none of those tests are less than 95 percent of specified strength. Strength tests included in the data shall be the most recent tests made on concrete of the proposed mix design and all shall have been made within one year of the proposed use of the concrete.

Contract No. «Dist»-«Contract\_No»



Trial batch test reports, in order to be acceptable, must indicate that the average compressive strength of 5 consecutive concrete cylinders, taken from a single batch, at not more than 28 days (or the maximum age allowed) after molding shall be at least 4 MPa greater than the specified 28-day compressive strength, and no individual cylinder shall have a strength less than the specified strength at the maximum age specified or allowed. Data contained in the report shall be from trial batches which were produced within one year of the proposed use of specified strength concrete in the project. Whenever air-entrainment is required, the air content of trial batches shall be equal to or greater than the air content specified for the concrete without reduction due to tolerances.

All tests shall be performed in conformance with either the appropriate California Test methods or the comparable ASTM test methods. All equipment employed in testing shall be in good condition and shall be properly calibrated. If the tests are performed during the life of the contract, the Engineer shall be notified sufficiently in advance of performing the tests in order to witness the test procedures.

The certified test data and trial batch test reports shall include the following information:

- A. Date of mixing.
- B. Mixing equipment and procedures used.
- C. The size of batch in cubic meters and the mass, type and source of all ingredients used.
- D. Penetration of the concrete.
- E. The air content of the concrete if an air-entraining admixture is used.
- F. The age at time of testing and strength of all concrete cylinders tested.

All certified test data and trial batch test reports shall be signed by an official of the firm which performed the tests.

When approved by the Engineer, concrete from trial batches may be used in the work at locations where concrete of a lower quality is required and the concrete will be paid for as the type or class of concrete required at that location.

After materials, mix proportions, mixing equipment, and procedures for concrete have been prequalified for use, additional prequalification by testing of trial batches will be required prior to making any changes which, in the judgment of the Engineer, could result in a lowering of the strength of the concrete below that specified.

The Contractor's attention is directed to the time required to test trial batches and the Contractor shall be responsible for production of trial batches at a sufficiently early date so that the progress of the work is not delayed.

When precast concrete members are manufactured at the plant of an established manufacturer of precast concrete members, the mix proportions of the concrete shall be determined by the Contractor, and a trial batch and prequalification of the materials, mix proportions, mixing equipment, and procedures will not be required.

Section 90-10.02A, "Portland Cement," of the Standard Specifications is renamed "Cementitious Material" and is amended to read:

**90-10.02A Cementitious Material.**—Cementitious material shall conform to the provisions in Section 90-1.01, "Description." Compressive strength requirements consist of a minimum strength which must be attained before various loads or stresses are applied to the concrete and, for concrete designated by strength, a minimum strength at the age of 28 days or at the age otherwise allowed in Section 90-1.01, "Description." The various strengths required are specified elsewhere or are shown on the plans.

The fifth paragraph in Section 90-10.02B, "Aggregate," of the Standard Specifications is deleted.  
Section 90-10.03, "Production," of the Standard Specifications is amended to read:

**90-10.03 Production.**—Cementitious material, water, aggregate, and admixtures shall be stored, proportioned, mixed, transported, and discharged in conformance with recognized standards of good practice, which will result in concrete that is thoroughly and uniformly mixed, that is suitable for the use intended, and which conforms to requirements specified herein. "Recognized standards of good practice" are outlined in various industry publications such as are issued by American Concrete Institute, AASHTO, or California Department of Transportation.

The cementitious material content of minor concrete shall conform to the provisions in Section 90-1.01, "Description."

The amount of water used shall result in a consistency of concrete conforming to the provisions in Section 90-6.06, "Amount of Water and Penetration." Additional mixing water shall not be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer.

Discharge of ready-mixed concrete from the transporting vehicle shall be made while the concrete is still plastic and before any stiffening occurs. An elapsed time of 1.5 hours (one hour in non-agitating hauling equipment), or more than 250 revolutions of the drum or blades, after the introduction of the cementitious material to the aggregates, or a temperature of concrete of more than 32° C. will be considered as conditions contributing to the quick stiffening of

concrete. The Contractor shall take whatever action is necessary to eliminate quick stiffening, except that the addition of water will not be permitted.

The required mixing time in stationary mixers shall be not less than 50 seconds nor more than 5 minutes.

The minimum required revolutions at mixing speed for transit-mixed concrete shall be not less than that recommended by the mixer manufacturer, and shall be increased, if necessary, to produce thoroughly and uniformly mixed concrete.

Each load of ready-mixed concrete shall be accompanied by a weight certificate which shall be delivered to the Engineer at the discharge location of the concrete, unless otherwise directed by the Engineer. The weight certificate shall be clearly marked with the date and time of day when the load left the batching plant and, if hauled in truck mixers or agitators, the time the mixing cycle started.

A Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished to the Engineer, prior to placing minor concrete from a source not previously used on the contract, stating that minor concrete to be furnished meets all contract requirements, including minimum cementitious material content specified.

The third and fourth paragraphs in Section 90-11.02, "Payment," of the Standard Specifications are amended to read:

Should the Engineer order the Contractor to incorporate any admixtures in the concrete when their use is not required by these specifications or the special provisions, furnishing the admixtures and adding them to the concrete will be paid for as extra work as provided in Section 4-1.03D.

Should the Contractor use admixtures as permitted under Sections 90-4.05, "Optional Use of Chemical Admixtures;" or 90-4.07, "Optional Use of Air-entraining Admixtures;" or should the Contractor request and obtain permission to use other admixtures for the Contractor's benefit, the Contractor shall furnish those admixtures and incorporate them in the concrete at the Contractor's expense and no additional compensation will be allowed therefor.

## **8-2.02 FREEZE-THAW REQUIREMENTS**

Aggregates proposed for use in portland cement concrete and precast portland cement concrete products shall pass the freezing and thawing test, as specified in Section 90-2.02, "Aggregates," of the Standard Specifications and these special provisions.

A list of sources of aggregates which have previously passed the freeze-thaw test is available at the District Office in Marysville, California.

The Contractor's attention is directed to the fact that California Test 528, "Test for Freeze-Thaw Resistance of Aggregates in Air-Entrained Concrete," does not include procedures that determine compliance of the aggregates with the other requirements of the plans and specifications.

The mortar strength of fine aggregate relative to the mortar strength of Ottawa sand shall be 100 percent, minimum, as determined by California Test 515.

Unless a higher cement content is otherwise required, the minimum cement content for all portland cement concrete and for all precast portland cement concrete products shall be 350 kilograms per cubic meter.

An air-entraining admixture conforming to the requirements in Section 90-4, "Admixtures," of the Standard Specifications shall be added to the concrete at the rate required to result in an air content of  $6 \pm 1.5$  percent in the freshly mixed concrete, unless a different air content is specified elsewhere in these special provisions.

## **8-2.03 CEMENT AND WATER CONTENT**

The amount of free water used in concrete for deck slabs of bridges and structure approach slabs shall not exceed  $180 \text{ kg/m}^3$ , plus 20 kg for each required 100 kg of cementitious material in excess of  $400 \text{ kg/m}^3$ .

The temperature of mixed concrete for deck slabs of bridges, immediately before placing, shall be not less than  $10^\circ\text{C}$  nor more than  $27^\circ\text{C}$ . Aggregates and water shall be heated or cooled as necessary to produce concrete within these temperature limits. Neither aggregates nor mixing water shall be heated to exceed  $65^\circ\text{C}$ . If ice is used to cool the concrete, discharge of the mixer will not be permitted until all ice is melted.

## **SECTION 8-3. WELDING**

### **8-3.01 WELDING ELECTRODES**

Flux core welding electrodes conforming to the requirements of AWS A5.20 E6XT-4 or E7XT-4 shall not be used to perform any type of welding for this project.

### 8-3.02 WELDING QUALITY CONTROL

Welding quality control shall conform to the requirements in the AWS welding codes, the Standard Specifications and these special provisions.

Welding quality control shall apply when any work is welded in conformance with the provisions in Section 49, "Piling," Section 52, "Reinforcement," Section 55, "Steel Structures," Section 56-1, "Overhead Sign Structures," Section 75-1.035, "Bridge Joint Restrainer Units," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

Wherever reference is made to the following AWS welding codes in the Standard Specifications, on the plans or in these special provisions, the year of adoption for these codes shall be as listed:

AWS Code	Year of Adoption
D1.1	1998
D1.4	1992
D1.5	1995
D1.5 (metric only)	1996

All requirements of the AWS welding codes shall apply unless specified otherwise in the Standard Specifications, on the plans or in these special provisions. Wherever the abbreviation AWS is used, it shall be equivalent to the abbreviations ANSI/AWS or ANSI/AASHTO/AWS.

The welding of all fracture critical members (FCMs) shall conform to the provisions specified in the Fracture Control Plan (FCP) and herein.

The Contractor shall designate in writing a welding Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for the quality of welding, including materials and workmanship, performed by the Contractor and all subcontractors.

The QCM shall be the sole individual responsible to the Contractor for submitting, receiving, and approving all correspondence, required submittals, and reports to and from the Engineer.

The QCM shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.

Welding inspection personnel or nondestructive testing (NDT) firms to be used in the work shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project, except for the following conditions:

1. The welding is performed at a permanent fabrication facility which is certified under the AISC Quality Certification Program, Category Cbr, Major Steel Bridges.
2. The welding is performed at a permanent fabrication facility which is certified under the AISC Quality Certification Program, Category Sbd, Conventional Steel Building Structures. This condition shall apply only for work welded in conformance with the provisions in Section 56-1, "Overhead Sign Structures" or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

For welding performed at such certified facilities, the inspection personnel or NDT firms may be employed or compensated by the fabrication facility performing the welding.

Prior to submitting the Welding Quality Control Plan (WQCP) required herein, a pre-welding meeting between the Engineer, Contractor and any welding subcontractors or entities hired by these subcontractors to be used in the work, shall be held to discuss the requirements for the WQCP.

Prior to performing any welding, the Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate WQCP for each item of work for which welding is to be performed. As a minimum, each WQCP shall include the following:

1. The name of the welding firm and the NDT firm to be used;
2. A manual prepared by the NDT firm that shall include equipment, testing procedures, code of safe practices, the Written Practice of the NDT firm, and the names, qualifications and documentation of certifications for all personnel to be used;
3. The name of the QCM and the names, qualifications and documentation of certifications for all Quality Control (QC) Inspectors and Assistant Quality Control Inspectors to be used;
4. An organizational chart showing all QC personnel and their assigned QC responsibilities;

5. The methods and frequencies for performing all required quality control procedures, including QC inspection forms to be used, as required by the specifications including:
  - (a) all visual inspections;
  - (b) all NDT including radiographic geometry, penetrometer and shim selection, film quality, film processing, radiograph identification and marking system, and film interpretation and reports; and
  - (c) calibration procedures and calibration frequency for all NDT equipment;
6. A system for the identification and tracking of all welds, NDT and any required repairs, and a procedure for the reinspection of any repaired welds. The system shall have provisions for 1) permanently identifying each weld and the person who performed the weld, 2) placing all identification and tracking information on each radiograph and 3) a method of reporting nonconforming welds to the Engineer;
7. Standard procedures for performing noncritical repair welds. Noncritical repair welds are defined as welds to deposit additional weld beads or layers to compensate for insufficient weld size and to fill limited excavations that were performed to remove unacceptable edge or surface discontinuities, rollover or undercut. The depth of these excavations shall not exceed 65 percent of the specified weld size;
8. The welding procedure specification (WPS), including documentation of all supporting Procedure Qualification Record (PQR) tests performed, and the name of the testing laboratory who performed the tests, to verify the acceptability of the WPS. The submitted WPS shall be within the allowable period of effectiveness;
9. Documentation of all certifications for welders for each weld process and position that will be used. Certifications shall list the electrodes used, test position, base metal and thickness, tests performed, and the witnessing authority. All certifications shall be within the allowable period of effectiveness; and
10. One copy each of all AWS welding codes and the FCP which are applicable to the welding to be performed. These codes and the FCP shall become the permanent property of the Department.
11. Example forms to be used for Certificates of Compliance, daily production logs, and daily reports.

The Engineer shall have 10 working days to review the WQCP submittal after a complete plan has been received. No welding shall be performed until the WQCP is approved in writing by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the WQCP, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

An amended WQCP or addendum shall be submitted to, and approved in writing by the Engineer, for any proposed revisions to the approved WQCP. An amended WQCP or addendum will be required for any revisions to the WQCP, including but not limited to a revised WPS, additional welders, changes in NDT firms or procedures, QC or NDT personnel, or updated systems for tracking and identifying welds. The Engineer shall have 3 working days to complete the review of the amended WQCP or addendum. Work that is affected by any of the proposed revisions shall not be performed until the amended WQCP or addendum has been approved. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the amended WQCP or addendum, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

After final approval of the WQCP, amended WQCP or addendum, the Contractor shall submit to the Engineer 7 copies each of these approved documents.

It is expressly understood that the Engineer's approval of the Contractor's WQCP shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformity with the requirements of the plans and specifications. The Engineer's approval shall not constitute a waiver of any of the requirements of the plans and specifications nor relieve the Contractor of any obligation thereunder, and defective work, materials and equipment may be rejected notwithstanding approval of the WQCP.

A daily production log for welding shall be kept by the QCM for each day that welding is performed. The log shall clearly indicate the locations of all welding, and shall include the welders' names, amount of welding performed, any problems or deficiencies discovered, and any testing or repair work performed, at each location. The daily report from each Quality Control Inspector shall also be included in the log.

The following items shall be included in a Welding Report that is to be submitted to the Engineer within 7 days following the performance of any welding:

1. Reports of all visual weld inspections and NDT;
2. Radiographs and radiographic reports, and other required NDT reports;
3. Documentation that the Contractor has evaluated all radiographs and other nondestructive tests, corrected all rejectable deficiencies, and all repaired welds have been reexamined by the required NDT and found acceptable; and
4. Daily production log.

All radiographic envelopes shall have clearly written on the outside of the envelope the following information: name of the QCM, name of the nondestructive testing firm, name of the radiographer, date, contract number, complete part description, and all included weld numbers or a report number, as detailed in the WQCP. In addition, all innerleaves shall have clearly written on them the part description and all included weld numbers, as detailed in the WQCP.

All reports regarding NDT, including radiographs, shall be signed by both the NDT technician and the person that performed the review, and then submitted directly to the QCM for review and signature prior to submittal to the Engineer. Corresponding names shall be clearly printed or typewritten next to all signatures.

The Engineer will review the Welding Report to determine if the Contractor is in conformance with the WQCP. Except for steel piling, the Engineer shall be allowed 7 days to review the report and respond in writing after a complete Welding Report has been received. The review time for steel piling shall be as specified in "Piling" of these special provisions. Prior to receiving notification from the Engineer of the Contractor's conformance with the WQCP, the Contractor may encase in concrete or cover any welds for which a Welding Report has been submitted. However, should the Contractor elect to encase or cover those welds prior to receiving notification from the Engineer, it is expressly understood that the Contractor shall not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase or cover any welds pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Sections 6.1.2 through 6.1.4.3 of AWS D 1.1, Sections 7.1.1 and 7.1.2 of AWS D 1.4, and Sections 6.1.1.1 through 6.1.3.3 of AWS D 1.5 are replaced with the following:

Quality Control (QC) shall be the responsibility of the Contractor. As a minimum, the Contractor shall perform inspection and testing prior to welding, during welding and after welding as specified in this section and additionally as necessary to ensure that materials and workmanship conform to the requirements of the contract documents.

The Quality Control (QC) Inspector shall be the duly designated person who performs inspection, testing, and quality matters for all welding.

Quality Assurance (QA) is the prerogative of the Engineer. The QA Inspector is the duly designated person who acts for and on behalf of the Engineer.

All QC Inspectors shall be responsible for quality control acceptance or rejection of materials and workmanship, and shall be currently certified as AWS Certified Welding Inspectors (CWI) in conformance with the requirements in AWS QC1, "Standard and Guide for Qualification of Welding Inspectors."

The QC Inspector may be assisted by an Assistant QC Inspector provided that this individual is currently certified as an AWS Certified Associate Welding Inspector (CAWI) in conformance with the requirements in AWS QC1, "Standard and Guide for Qualification of Welding Inspectors," or has equivalent qualifications. The QC Inspector shall monitor the Assistant QC Inspector's work, and shall be responsible for signing all reports.

When the term "Inspector" is used without further qualification, it shall refer to the QC Inspector.

Section 6.14.6, "Personnel Qualification," of AWS D 1.1, Section 7.7.6, "Personnel Qualification," of AWS D 1.4 and Section 6.1.3.4, "Personnel Qualification," of AWS D 1.5 are replaced with the following:

Personnel performing NDT shall be qualified in conformance with the requirements in the current edition of the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the Written Practice of the NDT firm. The Written Practice of the NDT firm shall meet or exceed the requirements of the current edition of the ASNT Recommended Practice No. SNT-TC-1A. Only individuals who are 1) qualified for NDT Level II, or 2) Level III technicians who have been directly certified by the ASNT and are authorized to perform the work of Level II technicians, shall perform NDT, review the results, and prepare the written reports.

Section 6.5.4, "Scope of Examination," of AWS D 1.1 and Section 7.5.4 of AWS D 1.4 are replaced with the following:

The QC Inspector shall inspect and approve the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved WPS are met.

Section 6.5.4 of AWS D 1.5 is replaced with the following:

The QC Inspector shall inspect and approve the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved WPS are met. The QC Inspector shall examine the work to make certain that it meets the requirements of section 3 and 9.21. The size and contour of welds shall be measured using suitable gages. Visual inspection for cracks in welds and base metal, and for other discontinuities should be aided by strong light magnifiers, or such other devices as may be helpful. Acceptance criteria different from those specified in this code may be used when approved by the Engineer.

The Engineer shall have the authority to verify the qualifications or certifications of any welder, Quality Control Inspector, or NDT personnel to specified levels by retests or other means.

A sufficient number of QC Inspectors shall be provided to ensure continuous inspection when any welding is being performed. Continuous inspection, as a minimum, shall include (1) having QC Inspectors continually present on all shifts when any welding is being performed, or (2) having a QC Inspector within such close proximity of all welding operations that inspections by the QC Inspector of each operation, at each welding location, shall not lapse for a period exceeding 30 minutes.

Inspection and approval of the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder shall be documented by the QC Inspector on a daily basis for each day that welding is performed.

The QC Inspector shall provide reports to the QCM on a daily basis for each day that welding is performed.

Except for noncritical weld repairs, base metal repairs, or any other type of repairs not submitted in the WQCP, the Engineer shall be notified immediately in writing when any welding problems or deficiencies are discovered and also of the proposed repair procedures to correct them. The Engineer shall have 5 working days to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the proposed repair procedures, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

When joint details that are not prequalified by the applicable AWS codes are proposed for use in the work, all welders using these details shall perform a qualification test plate using the approved WPS variables and the joint detail to be used in production. The test plate shall be the maximum thickness to be used in production. The test plate shall be mechanically or radiographically tested as directed by the Engineer. Mechanical and radiographic testing and acceptance criteria shall be as specified in the applicable AWS codes.

The period of effectiveness for a welder's or welding operator's qualification shall be a maximum of 3 years for the same weld process, welding position, and weld type. A valid qualification at the beginning of work on a contract will be acceptable for the entire period of the contract, as long as the welder's work remains satisfactory.

All qualification tests for welders, welding operators, and WPSs used in welding operations will be witnessed by the Engineer.

Section 6.6.5, "Nonspecified Nondestructive Testing Other Than Visual," of AWS D 1.1, Section 6.6.5 of AWS D 1.4 and Section 6.6.5 of AWS D 1.5 shall not apply.

For any welding, the Engineer may direct the Contractor to perform NDT that is in addition to the visual inspection or NDT specified in the AWS welding codes, in the Standard Specifications or in these special provisions. Additional NDT required by the Engineer, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Should any welding deficiencies be discovered by this additional NDT, the cost of the testing will not be paid for as extra work, and shall be at the Contractor's expense.

All required repair work to correct welding deficiencies, whether discovered by the required visual inspection or NDT, or by additional NDT directed by the Engineer, and any associated delays or expenses caused to the Contractor by performing these repairs, shall be at the Contractor's expense.

At the completion of all welding, the QCM shall sign and furnish to the Engineer, a certificate of compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each item of work for which welding was performed. The certificate shall state that all of the materials and workmanship incorporated in the work, and all required tests and inspections of this work, have been performed in conformance with the details shown on the plans and the provisions of the Standard Specifications and these special provisions.

Full compensation for conforming to all of the requirements of this section, Welding Quality Control, shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

## **SECTION 9. DESCRIPTION OF BRIDGE WORK**

The bridge work to be done consists, in general, of removing and replacing deck surfaces, replacing structure approach slabs and joint seals as shown on the plans for the following structures:

MAGRA OVERHEAD  
BRIDGE NUMBER 19-0028

ALTA ROAD UNDERCROSSING  
BRIDGE NUMBER 19-0111

TOWLE OVERHEAD  
BRIDGE NUMBER 19-0040

PUTT'S LAKE UNDERCROSSING  
BRIDGE NUMBER 19-0116L

## **SECTION 10. CONSTRUCTION DETAILS**

### **SECTION 10-1. GENERAL**

#### **10-1.00 CONSTRUCTION PROJECT INFORMATION SIGNS**

Before any major physical construction work readily visible to highway users is started on this contract, the Contractor shall furnish and erect 2 Type 2 Construction Project Information signs at the locations designated by the Engineer.

The signs and overlays shall be of a type and material consistent with the estimated time of completion of the project and shall conform to the details shown on the plans.

The sign letters, border and Caltrans construction logos shall conform to the colors (non-reflective) and details shown on the plans, and shall be on a white background (non-reflective). The colors blue and orange shall conform to PR Color Number 3 and Number 6, respectively, as specified in the Federal Highway Administration's Color Tolerance Chart.

The sign message to be used for fund types shall consist of the following, in the order shown:

#### **FEDERAL HIGHWAY TRUST FUNDS STATE HIGHWAY FUNDS**

The sign message to be used for type of work shall consist of the following:

#### **HIGHWAY REPAIR**

The sign message to be used for the Year of Completion of Project Construction will be furnished by the Engineer. The Contractor shall furnish and install the "Year" sign overlay within 10 working days of notification of the year date to be used.

The letter sizes to be used shall be as shown on the plans. The information shown on the signs shall be limited to that shown on the plans.

The signs shall be kept clean and in good repair by the Contractor.

Upon completion of the work, the signs shall be removed and disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

Full compensation for furnishing, erecting, maintaining, and removing and disposing of the construction project information signs shall be considered as included in the contract lump sum price paid for construction area signs and no additional compensation will be allowed therefor.

#### **10-1.01 ORDER OF WORK**

Order of work shall conform to the provisions in Section 5-1.05, "Order of Work," of the Standard Specifications and these special provisions.

It is anticipated that the annual "Hot August Nights" weekend celebrations will occur in the Reno area during the life of this contract. If notified by the Engineer, the Contractor shall keep all traffic lanes open for use by public traffic on Friday, Saturday, Sunday and Monday during this celebration. If this requirement delays the controlling operation as specified in Section 8-1.06, "Time of Completion," of the Standard Specifications, the days will be considered a non-working day, except as otherwise noted within these special provisions.

During construction where public traffic on the new concrete pavement is within 1.8 m of the vertical drop-off of said pavement, class 2 aggregate base or imported material (shoulder backing) shall be furnished, placed and compacted against the vertical face of the new concrete pavement. The base or shoulder backing material shall be placed to the level of the top of the new concrete pavement and tapered on a slope of 1:4 (vertical:horizontal) to the top of the existing surface. Full compensation for furnishing and placing the material on a 1:4 slope, regardless of the number of times it is required, and subsequent removing or reshaping of the material shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

Attention is directed to "Shoulder Backing" of these special provisions regarding portable delineators and C31 signs.

Attention is directed to "Concrete Pavement" of these special provisions regarding installing dowels at transverse contact joints and weakened plane joints, also bending of tie bars.

Only one westbound Truck Escape Ramp shall be closed at any one time. The signs for the closed truck escape ramp shall be covered as directed by the Engineer.

Crack existing concrete pavement shall be limited to that area which will receive an overlay of concrete pavement within the same year.

Work within the flowing water is confined to the period between June 15 and November 1.

No phase of the project may be started if that phase and its associated erosion control measures cannot be completed prior to the onset of a storm event if that construction phase may cause the introduction of sediments into the lake. 72-hour weather forecasts from the National Weather Service shall be consulted prior to start up of any phase of the project that may result in sediment runoff to the lake.

Temporary fence (environmentally sensitive area) shall be constructed as a first order of work.

All work at the ends of existing culverts shall be confined to the culvert work area shown on the plans.

The uppermost layer of new asphalt concrete pavement shall not be placed until all underlying conduits and loop detectors have been installed.

Attention is directed to "Maintaining Traffic" and "Temporary Pavement Delineation" of these special provisions and to the stage construction sheets of the plans.

Attention is directed to "Progress Schedule (Critical Path)" of these special provisions regarding the submittal of a general time-scaled logic diagram within 10 days after approval of the contract. The diagram shall be submitted prior to performing any work that may be affected by any proposed deviations to the construction staging of the project.

The work shall be performed in conformance with the stages of construction shown on the plans. Nonconflicting work in subsequent stages may proceed concurrently with work in preceding stages, provided satisfactory progress is maintained in the preceding stages of construction.

In each stage, after completion of the preceding stage, the first order of work shall be the removal of existing pavement delineation as directed by the Engineer. Pavement delineation removal shall be coordinated with new delineation so that lane lines are provided at all times on traveled ways open to public traffic.

Before obliterating any pavement delineation that is to be replaced on the same alignment and location, as determined by the Engineer, the pavement delineation shall be referenced by the Contractor, with a sufficient number of control points to reestablish the alignment and location of the new pavement delineation. The references shall also include the limits or changes in striping pattern, including one- and 2-way barrier lines, limit lines, crosswalks and other pavement markings. Full compensation for referencing pavement delineation shall be considered as included in the contract prices paid for new pavement delineation and no additional compensation will be allowed therefor.

At the end of each working day if a difference in excess of 40-millimeters exists between the elevation of the existing pavement and the elevation of any excavation within 1.5 m left of the traveled way and 2.4 m right of the traveled way, that is not separated from public traffic by temporary railing (Type K), material shall be placed and compacted against the vertical cuts adjacent to the traveled way. During excavation operations, native material may be used for this purpose, however, once the placing of the structural section commences, structural material or shoulder backing material shall be used. The material shall be placed to the level of the elevation of the top of existing pavement and tapered at a slope of 1:4 (vertical:horizontal) or flatter to the bottom of the excavation. Full compensation for placing the material on a 1:4 slope, regardless of the number of times it is required, and subsequent removing or reshaping of the material to the lines and grades shown on the plans shall be considered as included in the contract price paid for the materials involved and no additional compensation will be allowed therefor. No payment will be made for material placed in excess of that required for the structural section.

At locations exposed to public traffic where guard railings or barriers are to be constructed, reconstructed, or removed and replaced, the Contractor shall schedule the operations so that at the end of each working day there shall be no post holes open nor shall there be any railing or barrier posts installed without the blocks and rail elements assembled and mounted thereon and terminal sections temporarily attached to exposed ends of guardrail elements.

The Contractor shall furnish the Engineer with a statement from the vendor that the order for the seed required for this contract has been received and accepted by the vendor. The statement shall be furnished not less than 60 days prior to applying seeds. The statement from the vendor shall also include the names and quantity of seed ordered and the anticipated date of delivery.



Attention is directed to "Fiber Optic Cable Plant Specifications" of these special provisions regarding trenches in pavement to be overlaid with new surfaces.

Attention is directed to the requirements specified under "Erosion Control (Type D) and (Mulch)" elsewhere in these special provisions, regarding time restrictions for planting operations and seed application.

#### **10-1.02 WATER POLLUTION CONTROL**

Water pollution control work shall conform to the requirements in Section 7-1.01G, "Water Pollution," of the Standard Specifications and these special provisions.

This project shall conform to the requirements of General Construction Activity Storm Water Permit No. CAS000002 issued by the State Water Resources Control Board. This General Permit, hereafter referred to as the "Permit," regulates storm water discharges associated with construction activities.

Water pollution control work shall conform to the requirements in the Construction Contractor's Guide and Specifications of the Caltrans Storm Water Quality Handbooks, dated April 1997, and addenda thereto issued up to, and including, the date of advertisement of the project, hereafter referred to as the "Handbook". Copies of the Handbook and the General Permit may be obtained from the Department of Transportation, Material Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520.

Copies of the Handbook and the Permit are also available for review at the Northern Region Construction Office at 379-A Colusa Highway, Yuba City, California 95991.

The Contractor shall become fully informed of and comply with the applicable provisions of the Handbook, Permit and Federal, State and local regulations that govern the Contractor's operations and storm water discharges from both the project site and areas of disturbance outside the project limits during construction. The Contractor shall maintain a copy of the Permit at the project site and shall make the Permit available during construction activities.

Unless arrangements for disturbance of areas outside the project limits are made by the Department and made part of the contract, it is expressly agreed that the Department assumes no responsibility to the Contractor or property owner whatsoever with respect to any arrangements made between the Contractor and property owner to allow disturbance of areas outside the project limits.

The Contractor shall be responsible for the costs and for any liability imposed by law as a result of the Contractor's failure to comply with the requirements set forth in this section "Water Pollution Control", including but not limited to, compliance with the applicable provisions of the Handbook, Permit and Federal, State and local regulations. For the purposes of this paragraph, costs and liabilities include, but are not limited to, fines, penalties and damages whether assessed against the State or the Contractor, including those levied under the Federal Clean Water Act and the State Porter Cologne Water Quality Act.

In addition to any remedy authorized by law, so much of the money due the Contractor under the contract that shall be considered necessary by the Department may be retained by the State of California until disposition has been made of the costs and liabilities.

The retention of money due the Contractor shall be subject to the following:

1. The Department will give the Contractor 30 days notice of its intention to retain funds from any partial payment which may become due to the Contractor prior to acceptance of the contract. Retention of funds from any payment made after acceptance of the contract may be made without prior notice to the Contractor.
2. No retention of additional amounts out of partial payments will be made if the amount to be retained does not exceed the amount being withheld from partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications.
3. If the Department has retained funds and it is subsequently determined that the State is not subject to the costs and liabilities in connection with the matter for which the retention was made, the Department shall be liable for interest on the amount retained at the legal rate of interest for the period of the retention.

Conformance with the requirements of this section "Water Pollution Control" shall not relieve the Contractor from the Contractor's responsibilities, as provided in Sections 7-1.11, "Preservation of Property," 7-1.121, "Indemnification," and 7-1.122, "Insurance," of the Standard Specifications.

The Contractor shall, at reasonable times, allow authorized agents of the California Regional Water Quality Control Board, State Water Resources Control Board, U. S. Environmental Protection Agency and local storm water management agency, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the construction site and the Contractor's facilities pertinent to the work;
2. Have access to and copy any records that must be kept as specified in the Permit;
3. Inspect the construction site and related soil stabilization practices and sediment control measures; and
4. Sample or monitor for the purpose of ensuring compliance with the Permit.

The Contractor shall notify the Engineer immediately upon request from regulatory agencies to enter, inspect, sample, monitor or otherwise access the project site or the Contractor's records.

#### **STORM WATER POLLUTION PREVENTION PLAN PREPARATION, APPROVAL AND UPDATES**

As part of the water pollution control work, a Storm Water Pollution Prevention Plan, hereafter referred to as the "SWPPP," is required for this contract. The SWPPP shall conform to the requirements in Section 7-1.01G, "Water Pollution," of the Standard Specifications, the requirements in the Handbook, the requirements of the Permit and these special provisions. Upon the Engineer's approval of the SWPPP, the SWPPP shall be deemed to fulfill the requirements of Section 7-1.01G, "Water Pollution," of the Standard Specifications for development and submittal of a Water Pollution Control Program.

No work having potential to cause water pollution, as determined by the Engineer, shall be performed until the SWPPP has been approved by the Engineer.

Within 30 days after the approval of the contract, the Contractor shall submit 3 copies of the SWPPP to the Engineer. The Contractor shall allow 15 days for the Engineer to review the SWPPP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within 15 days of receipt of the Engineer's comments and shall allow 15 days for the Engineer to review the revisions. Upon the Engineer's approval of the SWPPP, 3 additional copies of the SWPPP, incorporating the required changes, shall be submitted to the Engineer. In order to allow construction activities to proceed, the Engineer may conditionally approve the SWPPP while minor revisions are being completed.

The objectives of the SWPPP shall be to identify pollution sources that may adversely affect the quality of storm water discharges associated with the project and to identify, construct, implement and maintain water pollution control measures, hereafter referred to as control measures, to reduce to the extent feasible pollutants in storm water discharges from the construction site both during and after construction is completed under this contract.

The SWPPP shall incorporate control measures in the following categories:

1. Soil stabilization practices;
2. Sediment control practices;
3. Sediment tracking control practices;
4. Wind erosion control practices; and
5. Non-storm water management and waste management and disposal control practices.

Specific objectives and minimum requirements for each category of control measures are contained in the Handbook.

The Contractor shall consider the objectives and minimum requirements presented in the Handbook for each of the above categories. When minimum requirements are listed for any category, the Contractor shall incorporate into the SWPPP and implement on the project, one or more of the listed minimum controls required in order to meet the pollution control objectives for the category. In addition, the Contractor shall consider other control measures presented in the Handbook and shall incorporate into the SWPPP and implement on the project the control measures necessary to meet the objectives of the SWPPP. The Contractor shall document the selection process in accordance with the procedure specified in the Handbook.

The SWPPP shall include, but not be limited to, the following items as described in the Handbook and Permit:

1. Source Identification;
2. Erosion and Sediment Controls;
3. Non-Storm Water Management;
4. Waste Management and Disposal;
5. Maintenance, Inspection and Repair;
6. Training;
7. List of Contractors and Subcontractors;
8. Post-Construction Storm Water Management;
9. Preparer;
10. A copy of the "Notice of Intent (NOI)" submitted by the Department for this project;
11. Copy of the "Notice of Intent (NOI)";
12. BMP Consideration Checklist;
13. SWPPP Checklist;
14. Schedule of Values; and
15. Water Pollution Control Drawings.

The Contractor shall amend the SWPPP, graphically and in narrative form, whenever there is a change in construction activities or operations which may affect the discharge of significant quantities of pollutants to surface waters, ground waters, municipal storm drain systems, or when deemed necessary by the Engineer. The SWPPP shall also be amended if it is in

violation of any condition of the Permit, or has not effectively achieved the objective of reducing pollutants in storm water discharges. Amendments shall show additional control measures or revised operations, including those in areas not shown in the initially approved SWPPP, which are required on the project to control water pollution effectively. Amendments to the SWPPP shall be submitted for review and approval by the Engineer in the same manner specified for the initially approved SWPPP. Approved amendments shall be dated and logged in the SWPPP. Upon approval of the amendment, the Contractor shall implement the additional control measures or revised operations.

The Contractor shall keep a copy of the SWPPP and approved amendments at the project site. The SWPPP shall be made available upon request of a representative of the Regional Water Quality Control Board, State Water Resources Control Board, U.S. Environmental Protection Agency or local storm water management agency. Requests by the public shall be directed to the Engineer.

By June 15 of each year, the Contractor shall submit an annual certification to the Engineer stating compliance with the requirements governing the Permit. If the project is in non-compliance at any time, the Contractor shall make a written report to the Engineer within 15 days of identification of non-compliance.

### **SCHEDULE OF VALUES**

The Contractor shall submit with the SWPPP, for approval by the Engineer, a schedule of values detailing the cost breakdown of the contract lump sum item for water pollution control. The schedule of values shall reflect the items of work, quantities and costs for control measures shown in the SWPPP, except for critical temporary controls and permanent control measures which are shown on the project plans and for which there is a contract item of work. Adjustments in the items of work and quantities listed in the schedule of values shall be made when required to address approved amendments to the SWPPP.

The sum of the amounts for the units of work listed in the schedule of values shall be equal to the contract lump sum price for water pollution control.

If approved in writing by the Engineer, the schedule of values will be used to determine progress payments for water pollution control during the progress of the work, and as the basis for calculating any adjustment in compensation for the contract item for water pollution control due to changes in the work ordered by the Engineer.

### **SWPPP IMPLEMENTATION**

Upon approval of the SWPPP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting and maintaining the control measures included in the SWPPP and any amendments thereto and for removing and disposing of temporary control measures. Unless otherwise directed by the Engineer or specified in these special provisions, the Contractor's responsibility for SWPPP implementation shall continue throughout any temporary suspension of work ordered in accordance with Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. Requirements for installation, construction, inspection, maintenance, removal and disposal of control measures are specified in the Handbook and these special provisions.

Soil stabilization practices and sediment control measures, including minimum requirements, shall be provided throughout the winter season, defined as between October 15 and April 15.

Implementation of soil stabilization practices and sediment control measures for soil-disturbed areas of the project site shall be completed, except as provided for below, no later than 20 days prior to the beginning of the winter season or upon start of applicable construction activities for projects which begin either during or within 20 days of the winter season.

Throughout the winter season, the active, soil-disturbed area of the project site shall be no more than 2 hectares. The Engineer may approve, on a case-by-case basis, expansions of the active, soil-disturbed area limit. The Contractor shall demonstrate the ability and preparedness to fully deploy soil stabilization practices and sediment control measures to protect soil-disturbed areas of the project site before the onset of precipitation. The Contractor shall maintain a quantity of soil stabilization and sediment control materials on site equal to 100 percent of that sufficient to protect unprotected, soil-disturbed areas on the project site and shall maintain a detailed plan for the mobilization of sufficient labor and equipment to fully deploy control measures required to protect unprotected, soil-disturbed areas on the project site prior to the onset of precipitation. The Contractor shall include a current inventory of control measure materials and the detailed mobilization plan as part of the SWPPP.

Throughout the winter season, soil-disturbed areas of the project site shall be considered to be nonactive whenever soil disturbing activities are expected to be discontinued for a period of 20 or more days and the areas are fully protected. Areas that will become nonactive either during the winter season or within 20 days thereof shall be fully protected with soil stabilization practices and sediment control measures within 10 days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur.

Throughout the winter season, active soil-disturbed areas of the project site shall be fully protected at the end of each day with soil stabilization practices and sediment control measures unless fair weather is predicted through the following work day. The weather forecast shall be monitored by the Contractor on a daily basis. The National Weather Service forecast shall be used, or an alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If

precipitation is predicted prior to the end of the following work day, construction scheduling shall be modified, as required, and the Contractor shall deploy functioning control measures prior to the onset of the precipitation.

The Contractor shall implement, year-round and throughout the duration of the project, control measures included in the SWPPP for sediment tracking, wind erosion, non-storm water management and waste management and disposal.

The Engineer may order the suspension of construction operations which create water pollution if the Contractor fails to conform to the requirements of this section "Water Pollution Control" as determined by the Engineer.

### **MAINTENANCE**

To ensure the proper implementation and functioning of control measures, the Contractor shall regularly inspect and maintain the construction site for the control measures identified in the SWPPP. The Contractor shall identify corrective actions and time frames to address any damaged measures or reinitiate any measures that have been discontinued.

The construction site inspection checklist provided in the Handbook shall be used to ensure that the necessary measures are being properly implemented, and to ensure that the control measures are functioning adequately. The Contractor shall submit one copy of each site inspection record to the Engineer.

During the winter season, inspections of the construction site shall be conducted by the Contractor to identify deficient measures, as follows:

1. Prior to a forecast storm;
2. After any precipitation which causes runoff capable of carrying sediment from the construction site;
3. At 24 hour intervals during extended precipitation events; and
4. Routinely, at a minimum of once every 2 weeks.

If the Contractor or the Engineer identifies a deficiency in the deployment or functioning of an identified control measure, the deficiency shall be corrected by the Contractor immediately, or by a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of subsequent precipitation events. The correction of deficiencies shall be at no additional cost to the State.

### **PAYMENT**

The contract lump sum price paid for prepare storm water pollution prevention plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work involved in developing, preparing, obtaining approval of, revising and amending the SWPPP as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Attention is directed to Sections 9-1.06, "Partial Payments," and 9-1.07, "Payment After Acceptance," of the Standard Specifications. Payments for prepare storm water pollution prevention plan will be made as follows:

1. After the SWPPP has been approved by the Engineer, 75 percent of the contract item price for prepare storm water pollution prevention plan will be included in the monthly partial payment estimate; and
2. After acceptance of the contract pursuant to Section 7-1.17, "Acceptance of Contract," the remaining 25 percent of the contract item price for prepare storm water pollution prevention plan will be made in accordance with Section 9-1.07.

The contract lump sum price paid for water pollution control shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in installing, constructing, maintaining, removing and disposing of control measures, except those shown on the project plans and for which there is a contract item of work, and excluding developing, preparing, obtaining approval of, revising and amending the SWPPP, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Changes in control measures required by an approved amendment to the SWPPP, except changes to those control measures shown on the project plans and for which there is a contract item of work, will be considered extra work, in accordance with Section 4-1.03D of the Standard Specifications and the following:

If the control measure is listed in the approved SWPPP schedule of values, an adjustment in compensation for the contract item for water pollution control will be made by applying the increase or decrease in quantities to the approved schedule of values. No adjustment of compensation will be made to the unit price listed for any item in the schedule of values due to any increase or decrease in the quantities, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," shall not apply to items listed in the schedule of values.

If the control measure is not listed in the approved SWPPP schedule of values, payment will be made by force account.

Those control measures which are shown on the project plans and for which there is a contract item of work will be measured and paid for as that item of work.

The Engineer will retain an amount equal to 25 percent of the estimated value of the contract work performed during estimate periods in which the Contractor fails to conform to the requirements of this section "Water Pollution Control" as determined by the Engineer.

Retentions for failure to conform to the requirements of this section "Water Pollution Control" shall be in addition to the other retentions provided for in the contract. The amounts retained for failure of the Contractor to conform to the requirements of this section will be released for payment on the next monthly estimate for partial payment following the date that an approved SWPPP has been implemented and maintained, and water pollution is adequately controlled, as determined by the Engineer.

#### **10-1.03 TEMPORARY FENCE (ENVIRONMENTALLY SENSITIVE AREAS)**

Temporary fence (environmentally sensitive areas) shall be furnished, constructed, maintained, and later removed as shown on the plans, as specified in these special provisions and as directed by the Engineer.

Attention is directed to "Order of Work" and "Environmentally Sensitive Areas" of these special provisions.

Except as otherwise specified in this section, temporary fence (environmentally sensitive areas) shall conform to the plan details and the specifications for permanent fence of similar character as provided in Section 80, "Fences," of the Standard Specifications.

Fabric shall be commercial quality woven polypropylene, orange in color.

Used materials may be installed provided the used materials are good, sound and are suitable for the purpose intended, as determined by the Engineer.

Materials may be commercial quality provided the dimensions and sizes of the materials are equal to, or greater than, the dimensions and sizes shown on the plans or specified herein.

Posts shall be either metal or wood at the Contractor's option.

Galvanizing and painting of steel items will not be required.

Treating wood with a wood preservative will not be required.

Concrete footings for metal posts will not be required.

Temporary fence that is damaged during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense.

When no longer required for the work, as determined by the Engineer, temporary fence shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this section.

Removed temporary fence materials that are not damaged may be constructed in the permanent work provided the materials conform to the requirements specified for the permanent work and such materials are new when used for the temporary fence.

Holes caused by the removal of temporary fence shall be backfilled in conformance with the provisions in the second paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

Quantities of temporary fence (environmentally sensitive area) to be paid for will be determined by the meter from actual measurements made parallel to the ground slope along the line of the completed fence, deducting the widths of openings.

The contract price paid per meter for temporary fence (environmentally sensitive area) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing temporary fence, complete in place, including maintaining, removing, and disposing of temporary fence, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.04 COOPERATION**

Attention is directed to Sections 7-1.14, "Cooperation," and 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications and these special provisions.

It is anticipated the following construction projects will be in progress during this contract:

03-3A2004, Pla-80- 87.8/110.2 (KP), during years 2000/2001

03-1A7904, Pla-80-53.5/62.7 (KP), during years 2001/2002

In the event of a loss caused to the Contractor due to unnecessary delays or failure to finish the work within the time specified for completion caused by another contractor under contract with the Department performing work for the State, the State will reimburse the delayed contractor in conformance with the provisions in Section 8-1.09 "Right of Way Delays," of the Standard Specifications. Deductions will be made from any moneys due or that may become due the contractor causing the loss or delay.

### 10-1.05 PROGRESS SCHEDULE (CRITICAL PATH)

Progress schedules will be required for this contract and shall conform to the requirements of these special provisions. Progress schedules shall utilize the Critical Path Method (CPM). Contractor's attention is directed to "Cooperation" and "Obstructions" elsewhere in these special provisions. Nothing in these special provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7, "Legal Relations and Responsibility," of the Standard Specifications.

**Definitions.**—The following definitions shall apply to these special provisions:

**Activity.**—Any task or item of work that shall be performed in order to complete a project.

**Baseline Schedule.**—The initial CPM progress schedule as accepted by the Engineer representing the Contractor's original work plan.

**Concurrent Delay.**—Two or more delays on the critical path that occur at the same time.

**Contract Completion Date.**—The date the Contractor is contractually obligated to complete the project, including any authorized adjustments, as specified in Section 8-1.06, "Time of Completion," of the Standard Specifications.

**Contractor Delay.**—A delay that extends the time required to complete a controlling operation caused by and within the control of the Contractor, his subcontractor at any tier or suppliers.

**Controlling Operation.**—A feature of work or activity on the critical path.

**Critical Path.**—In a project network, the sequence of activities yielding the longest path in a CPM analysis necessary to complete the project.

**Critical Path Method (CPM).**—A mathematical calculation method using the sequence of activities and their interrelationships, interdependencies, resources and durations to determine the critical path that shows the expected time to complete a project.

**Data Date.**—The day after the date through which progress updates have been calculated; everything occurring earlier than the data date is "As-Built," and everything on or after the data date is "Planned."

**Early Completion Time.**—The difference in time between the contract completion date and the current State-accepted scheduled completion date.

**Excusable Delay.**—A delay as defined in Section 8-1.07, "Liquidated Damages," of the Standard Specifications where the Contractor may be granted an extension of time commensurate with the provisions in Section 8-1.06, "Time of Completion," of the Standard Specifications with no entitlement for adjustment in compensation.

**Float.**—The amount of time between the early start date and the late start date or the early finish date and the late finish date of any activity or group of activities in the network.

**Free Float.**—The amount of time an activity can be delayed before delaying a subsequent activity.

**Fragnet.**—A section or fragment of the network diagram comprised of a group of activities.

**Milestone.**—A marker in a network which is typically used to mark a point in time or denote the beginning or end of a sequence of activities. A milestone has zero duration and zero resources, but will otherwise function in the network as if the milestone were an activity.

**Narrative Report.**—A report that identifies potential problem areas, current and anticipated delaying factors and their impact, actions taken or proposed, proposed changes in schedule logic, extension or contraction of activities, proposed addition or deletion of activities, explanation for changes in the critical path, explanation for changes in scheduled completion date, out of sequence work, and any other topics related to job progress or scheduling.

**Near Critical Path.**—A path having 10 working days or less of total float.

**Punch List.**—A list of details needing attention to complete task or work for both contract item and extra work.

**Schedule Revision.**—A change in the future portion of the schedule that modifies logic; alters construction sequences such as performing sequential activities concurrently or concurrent activities sequentially; adds or deletes activities or significantly alters activity durations, as determined or accepted by the Engineer.

**Scheduled Completion Date.**—The Contractor's scheduled completion date as shown on the accepted baseline schedule as modified by subsequent accepted schedule updates and revisions.

**State Delay.**—A delay that is attributable solely to the State, is beyond the control of the Contractor, and extends the time required to complete a controlling operation.

**State Owned Float Activity.**—The activity documenting time saved on the critical path by contract changes or other actions of the State, except contract change orders that result from significant Contractor development and investment.

**Time Impact Analysis.**—An analysis demonstrating the estimated time impact of a contract change order, delay or other event on the scheduled completion date.

**Total Float.**—The amount of time that an activity may be delayed without delaying the scheduled completion date.

**Update.**—The routine modification of the CPM progress schedule through a regular monthly review to incorporate actual past progress to date by activity, projected completion dates, and approved time adjustments.

**Materials (Computer System).**—The Contractor shall provide a computer system for the State's exclusive possession and use for CPM progress schedules. The minimum computer system to be furnished shall be complete with keyboard, mouse, monitor, printer and plotter. The system shall be from those identified by the Gartner Group as Tier 1 and shall also conform to the following requirements:

1. Latest industry-available Intel Pentium processor, Motorola RISC processor or equivalent.
2. Latest computer operating system software compatible with the selected processor, either Windows or MACINTOSH.
3. Minimum of 128 megabytes of random access memory (RAM).
4. Internal drives, including: one 4-gigabyte minimum hard disk drive, one 1.44 megabyte 3.5-inch floppy disk drive, one Iomega Jaz drive with two 1-gigabyte minimum cartridges, and one 32x speed CD-ROM drive.
5. Internal fax/modem, latest speed and software version of U.S. Robotics, 3COM or equivalent.
6. A 17-inch minimum, color monitor capable of at least 1,024 x 768 pixels.
7. A color-ink-jet-type, E-size plotter with a minimum 8 megabytes RAM, capable of 300 dots per inch color, 600 dots per inch monochrome, or equivalent, compatible with the selected system capable of plotting, in color, fully legible time-scaled logic diagrams, network diagrams, and bar charts. The plotter shall have the capability of being connected to or networked with a minimum of 5 computers.
8. A color-ink-jet-type, B-size plotter compatible with the selected system capable of printing fully legible, time-scaled charts, network diagrams and reports.
9. A manual parallel cable switching device, with connecting cables, allowing the user to alternate printing between the plotters.
10. CPM software shall be compatible with the hardware provided, shall be the latest version of Primavera Project Planner for Windows, SureTrak for Windows, or equal, and shall be able to create files that can easily be imported into the latest version of Primavera.
11. General software shall be latest versions of Microsoft Office Professional and McAfee VirusScan virus protection. The general software shall be compatible with the hardware provided.
12. Upgrades to the CPM and general software shall be provided, as the upgrades become available.

The computer hardware and software furnished by the Contractor shall be compatible with that used for the production of the CPM progress schedule required by these special provisions, including original instruction manuals and other documentation normally provided with the CPM and general software. Before delivery and setup of the computer system, the Contractor shall submit to the Engineer for approval a detailed list of the computer hardware and software the Contractor proposes to furnish, including an itemized schedule of costs for the system.

The Contractor shall furnish, install, set up, maintain and repair the computer system ready-for-use, and provide plotter supplies as necessary during the course of the project at a location determined by the Engineer. The first submittal of the baseline schedule will not be considered complete until the hardware and software are installed and ready for use with the submitted baseline schedule. The Contractor shall instruct and assist the Engineer in the use of the hardware and software. When requested by the Engineer, the Contractor shall provide one 8-hour session of outside commercial training in the use of the CPM software for a maximum of 2 project staff at a location acceptable to the Engineer. Hardware repairs shall be made within 48 hours of notification by the Engineer, or replacement equipment shall be furnished and installed by the Contractor until repairs have been completed.

Computer hardware and software furnished shall remain the property of the Contractor and shall be removed by the Contractor upon acceptance of the contract if no claims involving contract progress are pending. If contract claims involving contract progress are pending, computer hardware or software shall not be removed until the final estimate has been submitted to the Contractor.

**General.**—Early completion time shall be considered a resource for the exclusive use of the Contractor. The Contractor may increase early completion time by increasing production or reallocating resources to be more efficient, or by proposing, and the State accepting, contract change orders that are the result of significant Contractor development and investment or from an appropriate share of an accepted Cost Reduction Incentive Proposal.

State owned float shall be considered a resource for the exclusive use of the State. The Engineer may either accrue State owned float to mitigate past or anticipated future State delays, or reduce contract working days. The State may reduce contract working days if the action is the result of a contract change order other than those that result from significant Contractor development and investment. The Engineer will document State owned float by directing the Contractor in writing to update the State owned float activity and the activity relative to the State action that created the float. The Contractor shall conduct a time impact analysis to determine the effect of the change in the same manner described in "Schedule Time Adjustment", specified herein and shall include the impacts acceptable to the Engineer in the next update or revision. The Contractor shall include a log of the action in the State owned float activity, and include a discussion of the action in the narrative report of the next schedule update.

Contractor delays that are concurrent with State delays may be excusable, but are not compensable. Other Contractor delays are not excusable. Changes or delays that do not affect the controlling operation or operations on the critical path will not be considered as the basis for a time adjustment.

The State will be responsible for the impacts of: State delays; State's action or lack of action; utility companies who perform work on the project or impact the project schedule as set forth in Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications; and other contractors working directly for the State who impact the project or project schedule as specified in "Cooperation" of these special provisions. The Contractor shall mitigate these delays and impacts, and shall minimize the costs of these delays and impacts. If an unanticipated State delay or project impact results in an increased cost to the Contractor, the Contractor will be entitled to an adjustment in compensation in conformance with the provisions in Section 8-1.09, "Right of Way Delays" of the Standard Specifications.

The Contractor shall be responsible for assuring that the work sequences are logical and the network shows a coordinated plan for complete performance of the work. Failure of the Contractor to include in the schedule any element of work required for the performance of the contract shall not relieve the Contractor from completing the work within the time limit specified in the contract. If the Contractor or the Engineer discovers an undefined element of work, activity or logic, it shall be corrected by the Contractor in a schedule revision, as specified in these special provisions. If a planned activity requires greater-than-normal daily resources to accomplish, relative submittals shall include a narrative describing the activity, and the amount and use of the extraordinary resources.

The Baseline Schedule or Schedule Update submitted for acceptance shall not show variances from the requirements of these special provisions unless approved by the Engineer. The Contractor shall make specific mention of the variations in the letter of transmittal, and shall make the associated adjustments to the project schedule. The Contractor will not be relieved of the responsibility for executing the work in strict conformance with the provisions in the requirements of these special provisions. In the event of a conflict between the requirements of these special provisions and the information provided or shown on an accepted schedule, the requirements of these special provisions shall take precedence.

Each schedule submitted to the Engineer shall comply with the limits imposed by these special provisions, with the specified intermediate milestones and completion dates, and with the constraints, restraints or sequences included in these special provisions, except that after the Engineer accepts the baseline schedule, the Contractor may show a late scheduled completion date on subsequent updates or revisions. The degree of detail shall include factors to the satisfaction of the Engineer, including, but not limited to:

1. Physical breakdown of the project;
2. Contract milestones and completion dates, substantial completion dates, constraints, restraints, sequences of work shown in these special provisions, the planned substantial completion date, and the final completion date;
3. Type of work to be performed, the sequences, and the activities to be performed by subcontractors;
4. Procurement, submittal, submittal review, manufacture, test, delivery, and installation of major materials and equipment that require approval;
5. Preparation, submittal, and approval of shop or working drawings and material samples showing time, as specified in these special provisions, for the Engineer's review;
6. Identification of interfaces and dependencies with preceding, concurrent and follow-on contractors, railroads, and utilities as indicated in these special provisions;
7. Identification of each utility relocation or interface as a separate activity;
8. Batch plant erection and plant certification;
9. Erection and removal of falsework or shoring;
10. Submission and approval of reports or results for major tests, such as that for pile loading or traffic controllers;
11. Indicate long-term ramp and connector closing and opening events, traffic switches, and opening and closing of pavements to traffic as separate one day activities;
12. Punch-list and final clean-up.
13. State owned float as the last activity in the schedule, at the end of which is the Scheduled Completion Date.
14. Activity coding conventions shall include the following:



	Code	Value	Description
(1) Responsibility	RESP	CT	Caltrans
		UTIL	Utility Company
		RAIL	Railroad
		xxxx	Contractor
		xxxx	Subcontractor
		xxxx	others, as needed
(2) Stage	STGE	1	Stage 1
		2	Stage 2
		other designations	other descriptions, as needed
(3) Phase	PHAS	1	Phase 1
		2	Phase 2
		other phases	other phases, as needed
(4) Utilities	UTIL	PGE	Pacific Gas & Electric
		BELL	Pacific Bell
		GTE	GTE
		SCE	Southern California Edison
		other utilities	other utilities, as needed
The Contractor may include additional coding conventions, such as Ramps (RAMP), Facilities (FAC), and Events (EVNT).			

The work shall be executed in the sequence indicated in the accepted baseline schedule and subsequent accepted updates and revisions. Once the Engineer accepts a CPM schedule, the Contractor shall neither artificially improve the progress nor artificially change the quantity of float in any part of the schedule by artificially adding or deleting activities, revising schedule logic restraints, or changing planned activity durations. Schedule changes of planned work shall be documented in a properly submitted revision. The Contractor may improve the progress by performing sequential activities concurrently or by performing activities more quickly than planned. In the case of multiple critical paths, float generated by early completion of one or a sequence of activities will be considered in determining if that sequence of activities remains on the critical path.

The schedule shall be modified to reflect actual events and conditions, including non-work days, as these events and conditions occur for historical purposes and for use in time impact analysis. Submittals and Engineer review time shall be shown in the progress schedule, including CPM schedule updates and revisions. The duration of the Engineer review activity shall be 15 days unless specified otherwise in these special provisions.

The Contractor will be allowed to show an early or late scheduled completion date on schedule updates and revisions. The Engineer shall use the most current, accepted schedule update and revision, and Contractor-provided cause, time-impact and schedule-delay analysis that is acceptable to the Engineer to determine apparent impacts.

The Engineer shall be allowed 20 days to review and accept or reject the baseline schedule. The Engineer shall be allowed 15 days to review and accept or reject any updated or revised schedule. Rejected schedules shall be resubmitted to the Engineer within 5 days, at which time a new review period of 5 days will begin. After the baseline schedule is accepted, schedules that are not accepted or rejected within the required review period will be deemed to have been accepted by the Engineer. Acceptance of any schedule does not relieve the Contractor from the responsibility of submitting complete and accurate information.

**Pre-Construction Scheduling Conference.**—The Contractor shall schedule, and the Engineer will conduct a Pre-Construction Scheduling Conference with the Contractor's Project Manager and Construction Scheduler within 10 days after approval of the contract. At this meeting, the Engineer will review the requirements of this section of the special provisions with the Contractor. The Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations and shall be prepared to discuss the proposed work plan and schedule methodology that complies with the requirements in these special provisions. If the Contractor proposes deviations to the construction staging of the project, the Contractor shall submit a general time-scaled logic diagram displaying the deviations and resulting time impacts, and shall be prepared to discuss the proposal. At this meeting, the Contractor shall additionally submit the alpha-numeric coding structure and the activity identification system for labeling the work activities. To easily identify relationships, each activity description shall indicate its associated scope or location of work by including such terms as quantity of material, type of work, Bridge Number, Station to Station location, side of highway (such as left, right, northbound, southbound), lane number, shoulder, ramp name, ramp line descriptor or mainline. The Engineer will review and comment on the logic diagram, the coding structure and activity identification system within 15 days after submission by the Contractor. The Contractor shall make all modifications to the time-scaled logic diagram, the coding structure, and

activity identification system that the Engineer requests and shall employ that coding structure and identification system. The Contractor shall include the Engineer-requested modifications in the baseline schedule.

**Network Diagram and Project Schedule Reports**—Schedules submitted to the Engineer, including the baseline schedule, shall include originally-plotted time-scaled network diagram(s). Network diagrams shall be based on early start and early finish dates of activities shown. The network diagrams submitted to the Engineer shall also be accompanied by the CPM software-generated tabular reports for each activity included in the project schedule. Three different report sorts shall be provided: Early Start, Total Float, and Activity Number which shall show the predecessors and successors for each activity. Tabular reports (8 1/2" x 11" size) shall be submitted to the Engineer and shall include at a minimum, the following:

1. Data date;
2. Predecessor and successor activity numbers and descriptions;
3. Activity number and description;
4. Activity code(s);
5. Scheduled, or actual and remaining durations for each activity;
6. Earliest start date (by calendar date);
7. Earliest finish date (by calendar date);
8. Actual start date (by calendar date);
9. Actual finish date (by calendar date);
10. Latest start date (by calendar date);
11. Latest finish date (by calendar date);
12. Free Float, in work days;
13. Total Float, in work days;
14. Percentage of activity complete and remaining duration for incomplete activities;
15. Lag(s); and
16. Imposed constraints.

The networks shall be drafted time-scaled to show a continuous flow of information from left to right. The primary path(s) of criticality shall be clearly and graphically identified on the network(s). The network diagram shall be prepared on E-size sheets (34" x 44"), and shall have a title block in the lower right-hand corner and a timeline on each page. Exceptions to the size of the network sheets and the use of computer graphics to generate the networks shall be subject to the Engineer's approval.

The narrative report shall be organized as follows:

1. Contractor's Transmittal Letter
2. Work completed during the period
3. Identification of any unusual resources: manpower, material, or equipment restrictions or use, including multiple shifts, six day weeks, specified overtime, or work at times other than regular days or hours
4. Description of the current critical path
5. Changes to the critical path since the last schedule submittal
6. Description of problem areas
7. Current and anticipated delays
  - a. Cause of the delay
  - b. Impact of the delay on other activities, milestones, and completion dates
  - c. Corrective action and schedule adjustments to correct the delay
8. Pending items and status thereof
  - a. Permits
  - b. Change Orders
  - c. Time Adjustments
  - d. Non-Compliance Notices
9. Contract completion date(s) status
  - a. Ahead of schedule and number of days
  - b. Behind schedule and number of days
  - c. If date changes, explain the cause
10. Attached Updated Network Diagram and Reports

Contract No. «Dist»-«Contract\_No»

Schedule network diagrams, tabular reports and the narrative reports shall be submitted to the Engineer for acceptance in the following quantities:

1. Two sets of originally-plotted, time-scaled network diagram(s);
2. Two copies of each of the three sorts of the CPM software-generated tabular reports (8 1/2" x 11" size);
3. One 1.44-megabyte 3.5 inch floppy diskette containing the schedule data.
4. Two copies of the narrative report.

**Baseline Schedule Requirements.**—Within 30 days after approval of the contract, the Contractor shall submit a baseline schedule to the Engineer. The baseline project schedule shall have a data date of the first working day of the contract and shall not include any completed work to-date. The baseline schedule shall be practicable; include the entire scope of work; meet interim target dates, milestones, stage construction requirements, and internal time constraints; show logical sequence of activities; and shall not extend beyond the number of working days originally provided in these special provisions. An early completion schedule will be acceptable provided that the schedule meets the requirements of these special provisions and the Standard Specifications.

The baseline CPM progress schedule submitted by the Contractor shall have a sufficient number of activities to assure adequate planning of the project, and to permit monitoring and evaluation of progress, and the analysis of time impacts. The baseline schedule shall depict how the Contractor plans to complete the whole work involved, and shall show the activities that define the critical path. Multiple critical paths and near-critical paths shall be kept to a minimum, as determined by the Engineer. A total of not more than 50 percent of the baseline schedule activities shall be critical or near-critical, unless otherwise approved by the Engineer.

Activities shall have a duration of not less than one working day nor more than 20 working days, unless otherwise approved by the Engineer. The activities in the baseline schedule, with the exception of the first and last activities, shall have a minimum of one predecessor and a minimum of one successor. The baseline schedule shall not attribute negative float or negative lag to any activity.

**Monthly Schedule Updates.**—On or before the first calendar day of each month, the Contractor shall meet with the Engineer to review contract progress. At the monthly progress meeting the Contractor shall submit to the Engineer an update of the network diagram and project schedule reports as defined above. Update schedules shall have a data date of the twenty-first calendar day of the month, or other date as established by the Engineer, and shall include the information available up to that date. Durations for work that has been completed will be shown on the schedule as the work actually occurred, including Engineer submittal review and Contractor resubmittal times.

**Schedule Revisions.**—When the Contractor proposes a revision to an accepted schedule, the Contractor shall state in writing the reasons for the change, as well as the specifics, such as, but not limited to, revisions to activities, logic, durations, and other matters pertinent to the proposed revisions. If the Engineer considers a schedule revision to be of a major nature, the Engineer may require the Contractor to revise and submit for acceptance the affected portion(s) of the project schedule and an analysis to show the effect on the entire project. In addition to the revision submittal, the Contractor shall submit a schedule update with the same data date as the revision which is to reflect the project condition just prior to implementing the revision. The Contractor shall discuss contemplated revisions with the Engineer prior to the submittal.

Within 15 days, the Contractor shall submit a revised CPM network for approval when requested by the Engineer, or when any of the following occurs:

1. There is a significant change in the Contractor's operations that affects the critical or near critical path(s).
2. The scheduled completion date of the current submitted updated CPM schedule indicates that the contract progress is 20 days or more behind the current accepted schedule or revision.
3. The Contractor or the Engineer considers that an approved or anticipated change will impact the critical or near critical path or contract progress.

**Schedule Time Adjustment.**—When the Contractor requests a time adjustment due to contract change orders or delays, or if the Contractor or the Engineer considers that an approved or anticipated change will impact the critical path or contract progress, the Contractor shall submit a written time impact analysis to the Engineer illustrating the impacts of each change or delay on the current scheduled completion date or milestone completion date. The analysis shall use the currently accepted schedule that has a data date closest to and prior to the event. If the Engineer determines that the currently accepted schedule does not appropriately represent the conditions prior to the event, the schedule shall be updated to the day before the event being analyzed. An additional analysis shall be performed after the completion of said event. If the event is on the critical path at the time of its completion, then the difference between the scheduled completion dates of these 2 analyses shall be equal to the adjustment in time. The time impact analysis shall include one or more fragnet(s) demonstrating how the

Contractor proposes to incorporate the event(s) into the schedule, including logic and duration of the proposed activities. Until such time that the Contractor provides the analysis, the Engineer may, at his option, construct and utilize the project as-built schedule or other recognized method to determine delay impacts.

Time impact analyses shall be submitted in duplicate within 15 days of a delay, and shall be used in determining contract change order days. Approval or rejection of each time impact analysis by the Engineer will be made within 15 days after receipt of the time impact analysis. In the event the Contractor does not agree with the decision of the Engineer regarding the impact of a change or delay, notice shall be given in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications.

**Final Schedule Update.**—Within 30 days after acceptance of the contract by the Director, the Contractor shall submit a final update of the schedule (as-built schedule) with actual start and actual finish dates for the activities. The Contractor shall submit a written certificate with this submittal signed by the Contractor's Project Manager and an officer of the company stating "To the best of my knowledge, the enclosed final update of the project schedule reflects the actual start and completion dates of the actual activities for the project contained herein." An officer of the company may delegate in writing the authority to sign the certificate to a responsible manager. Submittal of the final schedule update and the certification shall be a condition precedent to the release of any retained funds under the contract.

**Payment.**—Progress schedule (critical path) will be paid for at a lump sum price. The contract lump sum price paid for progress schedule (critical path) shall include full compensation for furnishing all labor, material (including computer hardware and software), tools, equipment, and incidentals; and for doing all the work involved in preparing, furnishing, updating, and revising progress schedules; maintaining and repairing the computer hardware; and instructing and assisting the Engineer in the use of the computer hardware and software, as specified in the Standard Specifications and in these special provisions, and as directed by the Engineer. Payments for the progress schedule (critical path) contract item will be made as follows:

1. A total of 50 percent of the progress schedule (critical path) contract item amount will be made upon achieving all of the following: 5 percent of all work completed, accepted baseline, all accepted required schedule updates and revisions, and required CPM training.
2. A total of 60 percent of the progress schedule (critical path) contract item amount will be made upon achieving all of the following: 25 percent of all work completed, accepted baseline, and all accepted required schedule updates and revisions.
3. A total of 75 percent of the progress schedule (critical path) contract item amount will be made when 50 percent of all work completed, accepted baseline, and all accepted required schedule updates and revisions.
4. A total of 100 percent of the progress schedule (critical path) contract item amount will be made when 100 percent of all work completed, accepted baseline, all accepted required schedule updates and revisions, and a completed and certified Final Schedule Update.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications, shall not apply to the item of progress schedule (critical path). Adjustments in compensation for progress schedule (critical path) will not be made for any increased or decreased work ordered by the Engineer in furnishing progress schedules.

**Retention.**—The Department will retain an amount equal to 25 percent of the estimated value of the work performed during each estimate period in which the Contractor fails to submit pre-construction scheduling documents, an acceptable baseline, acceptable updated schedule, or acceptable revised progress schedule (critical path) conforming to the requirements of these special provisions as determined by the Engineer. Retentions for failure to submit acceptable CPM progress schedules shall be in addition to other retentions provided for in the contract. Retentions for failure to submit progress schedules (critical path) will be released for payment on the next monthly estimate for partial payment following the date that pre-construction scheduling documents and acceptable progress schedules (critical path) are submitted to the Engineer, and no interest will be due the Contractor.

#### **10-1.06 OVERHEAD**

Overhead shall consist of the time related overhead costs of the Contractor as specified in this special provision and will be paid for in accordance with these special provisions.

Attention is directed to "Force Account Payment" and "Progress Schedule (Critical Path)" of these special provisions.

Sections 4-1.03B, "Increased and Decreased Quantities," 4-1.03C, "Changes in Character of Work," and 9-1.08, "Adjustment of Overhead Costs," of the Standard Specifications shall not apply to overhead.

Overhead shall consist of those time related overhead costs, including field and home office overhead, that are in proportion to the time required to complete the work. Overhead shall not include costs that are not related to time, including but not limited to, mobilization, licenses, permits, and any other charges incurred only once during the contract.

Field office overhead expenses include time related costs associated with the normal and recurring operations of the construction project, and shall not include costs directly attributable to any of the work of the contract. Such time related costs include, but are not limited to, the salaries and benefits of project managers, general superintendents, field office managers and other field office staff assigned to the project, and rent, utilities, maintenance, security, supplies and equipment costs of the project field office. The rate of field office overhead shall exclude all one-time charges not related to time, such as mobilization, licenses, permits, and any other charges not incurred on a regular basis during the contract.

Home office overhead or general and administrative (G&A) expenses refer to the fixed costs of operating the Contractor's business. Such costs include, but are not limited to, general administration, insurance, personnel and subcontract administration, purchasing, accounting, and project estimating. The rate of home office overhead shall exclude expenses specifically related to other contracts or other businesses of the Contractor, equipment coordination, material deliveries, and consultant and legal fees.

The quantity of overhead to be paid will be measured by the day. The estimated amount will be based on the number of working days, excluding any days for plant establishment, as specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions. In the event an early completion progress schedule, as defined in "Progress Schedule (Critical Path)" of these special provisions, is submitted by the Contractor and approved by the Engineer, the quantity of overhead eligible for payment will be based on the total number of working days as specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions, rather than the Contractor's early completion progress schedule. The quantity of overhead, as measured above, will be adjusted only as a result of suspensions and adjustments of time which revise the current contract completion date and which are also any of the following:

1. suspensions of work ordered in accordance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications, except:
  - a. suspensions ordered due to weather conditions being unfavorable for the suitable prosecution of the controlling operation or operations; or
  - b. suspensions ordered due to the failure on the part of the Contractor to carry out orders given, or to perform any provision of the contract; or
  - c. any other suspensions mutually agreed upon between the Engineer and the Contractor.
2. extensions of time granted by the State in accordance with the provisions of the fifth paragraph in Section 8-1.07, "Liquidated Damages," of the Standard Specifications; or
3. reductions in contract time set forth in approved contract change orders, in accordance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.

In the event a Cost Reduction Incentive Plan (CRIP) is submitted by the Contractor, and is subsequently approved by the Engineer, which provides for a reduction in contract time, the quantity of overhead associated with the reduction in contract time, shall be considered as a net savings in the total cost of overhead. The Contractor will be paid 50 percent of the estimated net savings of the overhead, in accordance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications.

If the quantity of overhead, measured in accordance with this special provision, exceeds 149 percent of the number of days, specified in the Engineer's Estimate, the Contractor shall, within 60 calendar days of the Engineer's written request, submit to the Engineer an audit examination and report performed by an independent Certified Public Accountant of the Contractor's actual overhead costs. The independent Certified Public Accountant's audit examination is to be performed in accordance with the American Institute of Certified Public Accountants Attestation Standards. The audit examination is to determine if the total quantity of time related overhead is:

1. allowable in accordance with Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31;
2. adequately supported by reliable documentation; and
3. related solely to the project under examination.

The audit examination and report shall depict the Contractor's project and company-wide financial records and shall specify the actual overall average daily rates for both field and home office overhead for the entire duration of the project, and whether the costs have been properly allocated. The rates of field and home office overhead shall exclude all unallowable costs as determined in the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31. Upon the Engineer's written request, the Contractor shall make its financial records available for audit by the State for the purpose of verifying the actual

rate of time related overhead specified in the audit submitted by the Contractor. The actual rate of time related overhead specified in the audit, submitted by the Contractor, will be subject to approval by the Engineer.

If the Engineer elects, or if requested in writing by the Contractor, contract item payments for overhead, in excess of 149 percent of the number of days designated in the Engineer's Estimate, will be adjusted to reflect the actual rate.

The cost of performing an audit examination and submitting the report, requested by the Engineer, will be borne equally by the State and the Contractor. The division of the cost will be made by determining the cost of providing an audit examination in accordance with the provisions of Section 9-1.03B, "Work performed by Special Forces or Other Special Services" of the Standard Specifications, and paying to the Contractor one-half of that cost.

The contract price paid per day for overhead shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in overhead, complete in place, including all field and home office overhead costs incurred by the Contractor and by any joint venture partner, subcontractor, supplier or other party associated with the Contractor, and the Contractor's share of costs of audits of overhead costs requested by the Engineer, as specified in these special provisions, and as directed by the Engineer.

Full compensation for overhead costs involved in the performance of extra work at force account shall be considered as included in the markups specified in "Force Account Payment," of these special provisions.

Full compensation for overhead cost involved in performing additional contract item work that is not a controlling operation and for all overhead, other than the overhead measured and paid for as specified in this special provision, shall be considered as included in the various items of work involved, and no additional compensation will be allowed therefor.

For the purpose of making partial payments pursuant to the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications, the number of days to be included for payment in each monthly partial payment estimate for overhead will be the number of working days, specified above to be measured for payment, that occurred during that monthly estimate period. For progress pay purposes, the contract amount earned for overhead shall be either 100 percent of the contract item price for overhead or 20 percent of the original total contract amount divided by the number of working days specified in "Beginning of Work, Time of Completion and Liquidated Damages," of these special provisions times the number of working days specified above to be measured for payment that occurred during the monthly estimate period, whichever is the lesser.

After acceptance of the contract pursuant to the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, the amount, if any, not yet paid for the total contract item price for overhead and the amount, if any, payable for the contract item price for time overhead in excess of 20 percent of the original contract amount, will be included for payment in the first estimate made after acceptance of the contract in accordance with Section 9-1.07, "Payment After Acceptance," of the Standard Specifications.

#### **10-1.07 OBSTRUCTIONS**

Attention is directed to Sections 8-1.10, "Utility and Non-Highway Facilities," and 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

The Contractor's attention is directed to the existence of certain underground facilities that may require special precautions be taken by the Contractor to protect the health, safety and welfare of workers and of the public. Facilities requiring special precautions include, but are not limited to: conductors of petroleum products, oxygen, chlorine, and toxic or flammable gases; natural gas in pipelines greater than 150 mm in diameter or pipelines operating at pressures greater than 415 kPa (gage); underground electric supply system conductors or cables, with potential to ground of more than 300 V, either directly buried or in duct or conduit which do not have concentric grounded or other effectively grounded metal shields on sheaths.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include but are not limited to the following:

Notification Center	Telephone Number
Underground Service Alert-Northern California (USA)	1-800-642-2444 1-800-227-2600
Underground Service Alert-Southern California (USA)	1-800-422-4133 1-800-227-2600

If these facilities are not located on the plans in both alignment and elevation, no work shall be performed in the vicinity of the facilities, except as provided herein for conduit to be placed under pavement, until the owner, or the owner's representative, has located the facility by potholing, probing or other means that will locate and identify the facility. Conduit to be installed under pavement in the vicinity of these facilities shall be placed by the trenching method in conformance with the provisions in "Conduit" of these special provisions. If, in the opinion of the Engineer, the Contractor's operations are

delayed or interfered with by reason of the utility facilities not being located by the owner or the owner's representative, the State will compensate the Contractor for the delays to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications, and not otherwise, except as provided in Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications.

#### **10-1.08 MOBILIZATION**

Mobilization shall conform to the provisions in Section 11, "Mobilization," of the Standard Specifications.

#### **10-1.09 CONSTRUCTION AREA SIGNS**

Construction area signs shall be furnished, installed, maintained, and removed when no longer required in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

The Contractor shall notify the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to commencing excavation for construction area sign posts. The regional notification centers include but are not limited to the following:

Notification Center	Telephone Number
Underground Service Alert-Northern California (USA)	1-800-642-2444 1-800-227-2600
Underground Service Alert-Southern California (USA)	1-800-422-4133 1-800-227-2600

Excavations required to install construction area signs shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it is determined there are no utility facilities in the area of the proposed post holes.

The second sentence of the third paragraph in Section 12-3.02, "Barricades," of the Standard Specifications is amended to read:

The entire area of orange and white stripes shall be Type I, engineering grade, or Type II, super engineering grade, retroreflective sheeting conforming to the requirements of ASTM Designation: D 4956-95.

The third paragraph in Section 12-3.06A, "Stationary Mounted Signs," of the Standard Specifications is amended to read:

Sign panels for stationary mounted signs shall consist of Type III or Type IV reflective sheeting applied to an aluminum substrate conforming to the requirements in the Department's "Specifications for Reflective Sheeting Aluminum Signs." The type of reflective sheeting, Type III or Type IV, shall be at the Contractor's option and sign substrates fabricated from materials other than aluminum may be used when specified in the special provisions.

Legend and border may be applied by a screening process or by use of pressure sensitive cut-out sheeting. Size and spacing of letters and symbols shall be as depicted on the sign specification sheets published by the Department.

Rectangular signs over 1375 mm measured along the horizontal axis, and diamond-shaped signs 1500 mm and larger shall be framed unless otherwise specified. Frames shall be constructed in conformance with the requirements of the Department's "Framing Details for Sheet Aluminum Signs," Sheets 1 through 4 and Table 1 on Sheet 5.

Copies of the Department's "Specifications for Reflective Sheeting Aluminum Signs," "Framing Details for Sheet Aluminum Signs," and sign specification sheets may be obtained from the Department's Office of Business Management, Materiel Operations Branch, 1900 Royal Oaks Drive, Sacramento, CA 95815.

The second paragraph in Section 12-3.06B, "Portable Signs," of the Standard Specifications is amended to read:

Sign panels for portable signs shall conform to the provisions of sign panels for stationary mounted signs in Section 12-3.06A, "Stationary Mounted Signs," or shall be Type VI reflective sheeting as specified in the special provisions, or shall be cotton drill fabric, flexible industrial nylon fabric, or other approved fabric. Fabric signs shall not be used during the hours of darkness. Size, color, and legend requirements for portable signs shall be as described for stationary mounted sign panels in Section 12-3.06A. The height to the bottom of the sign panel above the edge of traveled way shall be at least 0.3-m.

The third paragraph in Section 12-3.06B, "Portable Signs," of the Standard Specifications is deleted.

Sign substrates for stationary mounted construction area signs may be fabricated from fiberglass reinforced plastic as specified under "Approved Traffic Products" of these special provisions.

Type VI reflective sheeting for sign panels for portable construction area signs shall conform to the provisions in "Approved Traffic Products" of these special provisions.

#### **10-1.10 MAINTAINING TRAFFIC**

Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications and to the Sections entitled "Public Safety" and "Portable Changeable Message Sign", elsewhere in these special provisions, and these special provisions. Nothing in these special provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7-1.09.

Attention is directed to "Traffic Plastic Drums " in these special provisions regarding using plastic drums in place of portable delineators, cones or Type I or II barricades.

Portable delineators shall be furnished and placed during stage construction as shown on the traffic handling plans. Full compensation for furnishing, placing, moving, maintaining and removing the portable delineators shown on the traffic handling plans shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

Lane and ramp closures shall conform to the provisions in the section of these special provisions entitled "Traffic Control System for Lane Closure."

Any traffic control operation may involve support by the California Highway Patrol (CHP). The Contractor shall prepare written lane closure schedules in accordance with the requirements listed in "Closure Requirements And Conditions," elsewhere in these special provisions. Any costs incurred by the CHP, as a result of late notification to the Engineer of cancellation of a lane closure will be deducted from any moneys due, or that may become due, the Contractor under the contract.

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or shoulders, including any section closed to public traffic.

The Contractor shall notify local authorities (including the California Highway Patrol (CHP), Placer County Sheriff's Department, State of California Department of Forestry, District 3 Whitmore Maintenance Station, and Local Fire Departments) of the Contractor's intent to begin work at least 5 days before work is begun. The Contractor shall cooperate with local authorities relative to handling traffic through the area and shall make all arrangements relative to keeping the working area clear of parked vehicles.

Access to the Whitmore Maintenance Station shall be maintained at all times.

On multilane roadways, whenever vehicles or equipment are parked on the shoulder within 1.8 m of a traffic lane, the shoulder area shall be closed as shown on the plans.

A portable changeable message sign shall be placed for each lane, ramp, or shoulder closure and detour to next ramp closure prior to the first advance warning sign shown on the plans, or as directed by the Engineer.

Two portable changeable message signs shall be in operation at all times during stage construction at locations directed by the Engineer.

One portable changeable message sign shall be in operation at all times for westbound truck brake inspection at locations directed by the Engineer.

On two-lane, two-way roadways, whenever vehicles or equipment are parked on the shoulder within 1.8 m of a traffic lane, the shoulder area shall be closed with fluorescent traffic cones or portable delineators placed on a taper in advance of the parked vehicles or equipment and along the edge of the pavement at 7.5 m intervals to a point not less than 7.5 m past the last vehicle or piece of equipment. A minimum of 9 cones or portable delineators shall be used for the taper. A C23 (Road Work Ahead) or C24 (Shoulder Work Ahead) sign shall be mounted on a portable sign stand with flags. The sign shall be placed where directed by the Engineer.

Except as noted herein, lanes and ramps (including detour to next ramp) shall be closed only during the hours shown on the charts included in this section "Maintaining Traffic." Except work required under Sections 7-1.08 and 7-1.09, work that interferes with public traffic shall be performed only during the hours shown for lane closures.

The maximum length of lane closure shall be limited to 1.6 km.

The Contractor shall notify the Engineer 7 calendar days prior to a ramp closure. A portable changeable message sign shall be placed a minimum of 3 calendar days in advance of closing the ramp. When a ramp is closed, public traffic shall be detoured to the next ramp as directed by the Engineer. When portable changeable message signs are no longer required, they shall be removed as directed by the Engineer.

No two consecutive on-ramp or consecutive off-ramp in the same direction of travel shall be closed at the same time except as otherwise provided in these special provisions and as permitted by the Engineer.



The Contractor shall schedule his operations so that between October 15 and April 15, there is no vertical drop-off between adjacent traffic lanes, or between traffic lanes and shoulders and the full width of the traveled way and shoulders shall be open for use by public traffic.

No ramp closure will be permitted for any longer than one work shift.

On two-lane, two-roadways, a minimum of one paved traffic lane, not less than 3.0 m wide, shall be open for use by public traffic. When construction operations are not actively in progress, not less than 2 of these lanes shall be open to public traffic.

During blasting operations, the road may be closed and public traffic stopped for periods not to exceed 10 minutes. After each closure, all accumulated traffic shall be allowed to pass through the work before another closure is made.

Except as noted herein, on Route 80, the full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

Designated legal holidays are: January 1st, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, November 11th, Thanksgiving Day, and December 25th. When a designated legal holiday falls on a Sunday, the following Monday shall be a designated legal holiday. When a designated legal holiday falls on a Saturday, the preceding Friday shall be a designated legal holiday. When a designated legal holiday falls on a Monday, the full width of the traveled way shall be open for use by public traffic on the preceding Friday, Saturday and Sunday.

Minor deviations from the requirements of this section concerning hours of work which do not significantly change the cost of the work may be permitted upon the written request of the Contractor if in the opinion of the Engineer, public traffic will be better served and the work expedited. These deviations shall not be adopted by the Contractor until the Engineer has approved them in writing. All other modifications will be made by contract change order.

Chart No. 1 Multilane Lane Requirements																									
Direction: WESTBOUND													Location: Pla-80-62.7/88.2												
FROM HOUR TO HOUR	a.m.												p.m.												
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	
Mondays	1	1	1	1	1	1	1	1	1	1	1	1						1	1	1	1	1	1	1	
Tuesdays through Thursdays	1	1	1	1	1	1	1	1	1	1	1	1	1	1				1	1	1	1	1	1	1	
Fridays	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
Saturdays	1	1	1	1	1	1	1	1	1	1															
Sundays																						1	1	1	
Day before designated legal holiday																									
Designated legal holidays																									
Legend:																									
1	One lane, a minimum of 3.4 m wide, shall be open in direction of travel																								
	No lane closure allowed																								
REMARKS: THIS CHART FOR ALL WORK EXCEPT AS NOTED HEREIN.																									
Two lanes available.																									
Ramp closures allowed during lane closures.																									

Chart No. 2 Multilane Lane Requirements																									
Direction: EASTBOUND													Location: Pla-80-62.7/88.2												
FROM HOUR TO HOUR	a.m.											p.m.													
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays	1	1	1	1	1	1	1	1	1	1	1							1	1	1	1	1	1	1	
Tuesdays through Thursdays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1	
Fridays	1	1	1	1	1	1	1	1	1	1	1	1													
Saturdays	1	1	1	1	1	1	1	1																	
Sundays																						1	1	1	
Day before designated legal holiday																									
Designated legal holidays																									
Legend:																									
1	One lane, a minimum of 3.4 m wide, shall be open in direction of travel																								
	No lane closure allowed																								
REMARKS: THIS CHART FOR ALL WORK EXCEPT AS NOTED HEREIN.																									
Two lanes available.																									
Ramp closures allowed during lane closures.																									

Chart No. 3 Multilane Lane Requirements																										
Direction: WESTBOUND/EASTBOUND													Location: Pla-80-62.7/88.2													
FROM HOUR TO HOUR	a.m.												p.m.													
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Mondays	1	1	1	1	1	1	1	1	1	1	1								1	1	1	1	1	1		
Tuesdays through Thursdays	1	1	1	1	1	1	1	1	1	1	1	1							1	1	1	1	1	1		
Fridays	1	1	1	1	1	1	1	1	1	1	1															
Saturdays																										
Sundays																						1	1	1		
Day before designated legal holiday																										
Designated legal holidays																										
Legend:																										
1	One lane, a minimum of 3.4 m wide, shall be open in direction of travel																									
	No lane closure allowed																									
REMARKS: THIS CHART FOR PLACEMENT OF NEW PAVEMENT.																										
Two lanes available.																										
Ramp closures allowed during lane closures.																										

#### 10-1.11 CLOSURE REQUIREMENTS AND CONDITIONS

Lane closures shall conform to the provisions in "Maintaining Traffic" of these special provisions and these special provisions.

The term closure, as used herein, is defined as the closure of a traffic lane or lanes, including ramp or connector lanes, within a single traffic control system.

## **CLOSURE SCHEDULE**

By Noon Monday, the Contractor shall submit a written schedule of planned closures for next week period, defined as Friday Noon through the following Friday Noon.

The Closure Schedule shall show the locations and times when the proposed closures are to be in effect. The Contractor shall use closure schedule request forms furnished by the Engineer for this purpose. Closure schedules submitted with incomplete, unintelligible or inaccurate information will be returned for correction. The Contractor will be notified of disapproved closures or closures that will require coordination with other parties as a condition of approval.

Amendments to the Closure Schedule, including additional closures, shall be submitted to the Engineer, in writing, at least 3 working days in advance of any planned closure. Approval of amendments to the Closure Schedule will be at the discretion of the Engineer.

The Contractor shall confirm, in writing, all scheduled closures by no later than 8:00 a.m. 3 working days prior to the date on which the closure is to be made. Approval or denial of scheduled closures will be made by no later than 4:00 p.m. 2 working days prior to the date on which the closure is to be made. Closures not confirmed or approved will not be allowed.

Confirmed closures that are cancelled due to unsuitable weather may be rescheduled at the discretion of the Engineer for the next working day.

## **CONTINGENCY PLAN**

The Contractor shall prepare a contingency plan for reopening closures to public traffic. The Contractor shall submit the contingency plan for a given operation to the Engineer within one working day of the Engineer's request.

## **LATE REOPENING OF CLOSURES**

If a closure is not reopened to public traffic by the specified time, work shall be suspended in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. The Contractor shall not make any further closures until the Engineer has accepted a work plan, submitted by the Contractor, that will insure that future closures will be reopened to public traffic at the specified time. The Engineer will have 2 working days to accept or reject the Contractor's proposed work plan. The Contractor will not be entitled to any compensation for the suspension of work resulting from the late reopening of closures.

For each 15-minute interval, or fraction thereof past the time specified to reopen the closure, the Department will deduct \$1,900.00 per interval from moneys due or that may become due the Contractor under the contract.

## **COMPENSATION**

The Contractor shall notify the Engineer of any delay in the Contractor's operations due to the following conditions, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of those conditions, and the Contractor's loss due to that delay could not have been avoided by rescheduling the affected closure or by judicious handling of forces, equipment and plant, the delay will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09:

- A. The Contractor's proposed Closure Schedule is denied and his planned closures are within the time frame allowed for closures in "Maintaining Traffic" of these special provisions, except that the Contractor will not be entitled to any compensation for amendments to the Closure Schedule that are not approved.
- B. The Contractor is denied a confirmed closure.

Should the Engineer direct the Contractor to remove a closure prior to the time designated in the approved Closure Schedule, any delay to the Contractor's schedule due to removal of the closure will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09.

## **10-1.12 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE**

A traffic control system shall consist of closing traffic lanes and ramps in accordance with the details shown on the plans, the provisions of Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications, the provisions under "Maintaining Traffic" and "Construction Area Signs" elsewhere in these special provisions and these special provisions.

The provisions in this section will not relieve the Contractor from the responsibility to provide additional devices or take the measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

During traffic stripe operations and pavement marker placement operations using bituminous adhesive, traffic shall be controlled, at the option of the Contractor, with either stationary or moving type lane closures. During all other operations traffic shall be controlled with stationary type lane closures. The Contractor's attention is directed to the provisions in Section 84-1.04, "Protection From Damage," and Section 85-1.06, "Placement," of the Standard Specifications.

If any component in the traffic control system is displaced, or ceases to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the component to its original condition or replace the component and shall restore the component to its original location.

**STATIONARY TYPE LANE CLOSURE.**—When lane closures are made for work periods only, at the end of each work period, all components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, approved by the Engineer, within the limits of the highway right of way.

Each vehicle used to place, maintain and remove components of a traffic control system on multilane highways shall be equipped with a Type II flashing arrow sign, cellular phones and radios, which shall be in operation when the vehicle is being used for placing, maintaining, or removing the components. Vehicles equipped with Type II flashing arrow sign not involved in placing, maintaining, or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing arrow sign shown on the plans shall not be used on the vehicles which are doing the placing, maintaining and removing of components of a traffic control system, and shall be in place before a lane closure requiring its use is completed.

On 2-lane, 2-way roadways one-way traffic shall be controlled through the project in accordance with the plan entitled "Traffic Control System for Lane Closure on Two Lane Conventional Highways," and these special provisions.

When flaggers are required, all flaggers shall have radio contact with personnel in the work area.

All flaggers shall be equipped with cellular phones.

On 2-lane, 2-way roadways additional advance flaggers will be required.

On 2-lane, 2-way roadways utilizing a pilot car will be at the option of the Contractor. If the Contractor elects to use a pilot car, the cones shown along the centerline on the plan need not be placed. The pilot car shall have radio contact with personnel in the work area, and the maximum speed of the pilot car through the traffic control zone shall be 40 kilometers per hour (25 mph).

**MOVING TYPE LANE CLOSURE.**—Flashing arrow signs used in moving lane closures shall be truck-mounted. Flashing arrow signs shall be in the caution display mode when used on two-lane highways. Changeable message signs used in moving lane closure operations shall conform to Section 12-3.12, "Portable Changeable Message Signs," of the Standard Specifications, except the signs shall be truck-mounted and the full operation height of the bottom of the sign may be less than 2.1 m above the ground, but should be as high as practicable.

Truck-mounted crash cushions (TMCC) for use in moving lane closures shall be any of the following approved models, or equal:

Hexfoam TMA Series 3000, Alpha 1000 TMA Series 1000, Alpha 2001 TMA Series 2001, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076, Telephone (312) 467-6750.

Distributor(Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 1-800-884-8274, FAX (916) 387-9734.

Distributor(Southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone 1-800-222-8274.

Cal T-001 Model 2 or Model 3, manufacturer and distributor; Hexcel Corporation, 11711 Dublin Boulevard, P.O. Box 2312, Dublin, CA 94568, Telephone (510) 828-4200.

Renco Rengard Model Nos. CAM 8-815 and RAM 8-815, manufacturer and distributor, Renco Inc., 1582 Pflugerville Loop Road, P.O. Box 730, Pflugerville, TX 78660-0730, Telephone 1-800-654-8182.

Each TMCC shall be individually identified with the manufacturer's name, address, TMCC model number, and a specific serial number. The names and numbers shall each be a minimum 13 mm high, and located on the left (street) side at the lower front corner. The TMCC shall have a message next to the name and model number in 13 mm high letters which states, "The bottom of this TMCC shall be \_\_\_\_\_ mm  $\pm$  \_\_\_\_\_ mm above the ground at all points for proper impact performance." Any TMCC which is damaged or appears to be in poor condition shall not be used unless recertified by the manufacturer.

The Engineer shall be the sole judge as to whether used TMCCs supplied under this contract need recertification. Each unit shall be certified by the manufacturer to meet the requirements for TMCCs in accordance with the standards established by the Transportation Laboratory Structures Research Section.

Approvals for new TMCC designs proposed as equal to the above approved models shall be in accordance with the procedures (including crash testing), established by the Transportation Laboratory Structures Research Section. For information regarding submittal of new designs for evaluation contact: Transportation Laboratory, Structures Research Section, P.O. Box 19128, 5900 Folsom Boulevard, Sacramento, CA 95819.

New TMCCs proposed as equal to approved TMCCs or approved TMCCs determined by the Engineer to need recertification shall not be used until approved or recertified by the Transportation Laboratory Structures Research Section.

**PAYMENT.**—The contract lump sum price paid for traffic control system shall include full compensation for furnishing all labor (except for flagging costs), materials (including signs), tools, equipment and incidentals (including cellular phones and radios), and for doing all the work involved in placing, removing, storing, maintaining, moving to new locations, replacing and disposing of the components of the traffic control system and for furnishing and operating the pilot car, (including driver, radios, and any other equipment and labor required), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. Flagging costs will be paid for as provided in Section 12-2.02, "Flagging Costs," of the Standard Specifications.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications, shall not apply to the item of traffic control system. Adjustments in compensation for traffic control system will be made only for increased or decreased traffic control system required by changes ordered by the Engineer and will be made on the basis of the cost of the increased or decreased traffic control necessary. The adjustment will be made on a force account basis as provided in Section 9-1.03, "Force Account Payment," of the Standard Specifications for increased work, and estimated on the same basis in the case of decreased work.

Traffic control system required by work which is classed as extra work, as provided in Section 4-1.03D of the Standard Specifications, will be paid for as a part of the extra work.

#### **10-1.13 TEMPORARY PAVEMENT DELINEATION**

Temporary pavement delineation shall be furnished, placed, maintained, and removed in conformance with the provisions in Section 12-3.01, "General," of the Standard Specifications and these special provisions. Nothing in these special provisions shall be construed as reducing the minimum standards specified in the Manual of Traffic Controls published by the Department or as relieving the Contractor from the responsibilities specified in Section 7-1.09, "Public Safety," of the Standard Specifications.

##### **GENERAL**

Whenever the work causes obliteration of pavement delineation, temporary or permanent pavement delineation shall be in place prior to opening the traveled way to public traffic. Lane line or centerline pavement delineation shall be provided at all times for traveled ways open to public traffic. On multilane roadways (freeways and expressways) edgeline delineation shall be provided at all times for traveled ways open to public traffic.

The Contractor shall perform the work necessary to establish the alignment of temporary pavement delineation, including required lines or marks. Surfaces to receive temporary pavement delineation shall be dry and free of dirt and loose material. Temporary pavement delineation shall not be applied over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation shall be maintained until superseded or replaced with a new pattern of temporary pavement delineation or permanent pavement delineation.

Temporary pavement markers, including underlying adhesive, and removable traffic tape which is applied to the final layer of surfacing or existing pavement to remain in place or which conflicts with a subsequent or new traffic pattern for the area shall be removed when no longer required for the direction of public traffic, as determined by the Engineer.

##### **TEMPORARY LANELINE AND CENTERLINE DELINEATION**

Whenever lanelines or centerlines are obliterated and temporary pavement delineation to replace the lines is not shown on the plans, the minimum lane line and centerline delineation to be provided for that area shall be temporary reflective pavement markers placed at longitudinal intervals of not more than 7.3 m. The temporary reflective pavement markers shall be the same color as the lane line or centerline the pavement markers replace. Temporary reflective pavement markers shall be, at the option of the Contractor, one of the temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Approved Traffic Products" of these special provisions.

Temporary reflective pavement markers shall be placed in conformance with the manufacturer's instructions and shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used to place pavement markers in areas where removal of the pavement markers will be required.

Temporary laneline or centerline delineation consisting entirely of temporary reflective pavement markers placed on longitudinal intervals of not more than 7.3 m shall be used on lanes opened to public traffic for a maximum of 14 days. Prior to the end of the 14 days the permanent pavement delineation shall be placed. If the permanent pavement delineation is not placed within the 14 days, the Contractor shall provide additional temporary pavement delineation and shall bear the cost thereof. The additional temporary pavement delineation to be provided shall be equivalent to the pattern specified for the permanent pavement delineation for the area, as determined by the Engineer.

Full compensation for furnishing, placing, maintaining and removing the temporary reflective pavement markers (including underlying adhesive, layout (dribble) lines to establish alignment of temporary reflective pavement markers or used for temporary laneline and centerline delineation for those areas where temporary laneline and centerline delineation is not shown on the plans and for providing equivalent patterns of permanent traffic lines for those areas when required, shall be considered as included in the contract prices paid for the items of work that obliterated the laneline and centerline pavement delineation and no separate payment will be made therefor.

#### **TEMPORARY EDGELINE DELINEATION**

On multilane roadways (freeways and expressways) whenever edgelines are obliterated and temporary pavement delineation to replace those edgelines is not shown on the plans, the edgeline delineation to be provided for those areas adjacent to lanes open to public traffic shall be as follows:

Temporary pavement delineation for right edgelines shall, at the option of the Contractor, consist of either a solid 100-mm wide traffic stripe of the same color as the stripe the temporary edgeline delineation replaces, or traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 30 m.

Temporary pavement delineation for left edgelines shall, at the option of the Contractor, consist of either solid 100 mm wide traffic stripe of the same color as the stripe the temporary edgeline delineation replaces, or traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 30 m; or temporary reflective pavement markers placed at longitudinal intervals of not more than 1.8 m. Temporary pavement markers used for temporary left edgeline delineation shall be one of the types of temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Approved Traffic Products" of these special provisions.

100-mm wide traffic stripe placed for temporary edgeline delineation which will require removal shall conform to the provisions of "Temporary Traffic Stripe (Tape)" of these special provisions. Where removal of the 100-mm wide traffic stripe will not be required, painted traffic stripe conforming to the provisions of "Temporary Traffic Stripe (Paint)" of these special provisions may be used. The quantity of temporary traffic stripe (tape) or temporary traffic stripe (paint) used for this temporary edgeline delineation will not be included in the quantities of tape or paint to be paid for.

Temporary traffic stripe (paint) shall not be used for temporary edgeline delineation on the final layer of surfacing.

The lateral offset for traffic cones, portable delineators or channelizers used for temporary edgeline delineation shall be as determined by the Engineer. If traffic cones or portable delineators are used as temporary pavement delineation for edgelines, the Contractor shall provide personnel to remain at the job site to maintain the cones or delineators during the hours of the day that the portable delineators are in use.

Channelizers used for temporary edgeline delineation shall be the surface mounted type and shall be orange in color. Channelizer bases shall be cemented to the pavement in the same manner provided for cementing pavement markers to pavement in the section of these special provisions entitled "Pavement Markers," except epoxy adhesive shall not be used to place channelizers on the top layer of pavement. Channelizers shall be, at the Contractor's option, one of the surface mount types (900 mm) listed in "Approved Traffic Products" of these special provisions.

Temporary edgeline delineation shall be removed when no longer required for the direction of public traffic as determined by the Engineer.

Full compensation for furnishing, placing, maintaining, and removing temporary edgeline delineation, including underlying adhesive, for those areas where temporary edgeline delineation is not shown on the plans shall be considered as included in the contract prices paid for the items of work that obliterated the edgeline pavement delineation and no separate payment will be made therefor.

#### **TEMPORARY TRAFFIC STRIPE (TAPE)**

Temporary traffic stripe consisting of removable traffic stripe tape shall be applied at the locations shown on the plans. The temporary traffic stripe tape shall be complete in place at the location shown, prior to opening the traveled way to public traffic.

Removable traffic stripe tape shall be the temporary removable type traffic stripe tape listed in "Approved Traffic Products" of these special provisions.

Removable traffic stripe tape shall be applied in conformance with the manufacturer's installation instructions and shall be rolled slowly with a rubber tired vehicle or roller to ensure complete contact with the pavement surface. Traffic stripe tape shall be applied straight on tangent alignment and on a true arc on curved alignment. Traffic stripe tape shall not be applied

when the air or pavement temperature is less than 10°C, unless the installation procedures to be used are approved by the Engineer, prior to beginning installation of the tape.

When removable traffic stripe tape is specified for temporary left edgeline delineation, temporary reflective pavement markers placed at longitudinal intervals of not more than 1.8 m may be used in place of the temporary traffic stripe tape. Temporary reflective pavement markers shall be one of the types of temporary pavement markers listed for long term day/night use (6 months or less) in "Approved Traffic Products" of these special provisions. When temporary reflective pavement markers are used in place of tape, payment for those temporary pavement markers will be made on the basis of the theoretical quantity of temporary traffic stripe (tape), required for the left edgeline the temporary pavement markers replace.

#### **TEMPORARY TRAFFIC STRIPE (PAINT)**

Temporary traffic stripe consisting of painted traffic stripe shall be applied and maintained at the locations shown on the plans. The painted temporary traffic stripe shall be complete in place at the location shown, prior to opening the traveled way to public traffic. Removal of painted temporary traffic stripe will not be required.

Temporary painted traffic stripe shall conform to "Paint Pavement Markings" of these special provisions, except for payment and the number of coats shall be, at the option of the Contractor, either one or 2 coats regardless of whether on new or existing pavement.

At the Contractor's option, temporary removable striping tape listed in "Approved Traffic Products" of these special provisions may be used instead of painted temporary traffic stripes. When traffic stripe tape is used in place of painted temporary traffic stripes, the tape will be measured and paid for as temporary traffic stripe (paint).

When painted traffic stripe is specified for temporary left edgeline delineation, temporary reflective pavement markers placed at longitudinal intervals of not more than 1.8 m may be used in place of the temporary painted traffic stripe. Temporary reflective pavement markers shall be one of the types of temporary pavement markers listed for long term day/night use (6 months or less) in "Approved Traffic Products" of these special provisions. When temporary reflective pavement markers are used in place of temporary painted traffic stripe, payment for those temporary pavement markers will be made on the basis of the theoretical quantity of temporary traffic stripe (paint), required for the left edgeline the temporary pavement markers replace.

#### **MEASUREMENT AND PAYMENT**

Temporary traffic stripe (tape) will be measured and paid for by the meter, measured along the line of the stripe, with deductions for gaps in broken traffic stripes. Double and 200-mm temporary traffic stripes, shown on the plans as tape, will be measured as 2 temporary traffic stripes (tape).

Temporary traffic stripe (paint) will be measured and paid for in the same manner as specified for paint traffic stripe (1-coat) specified in Section 84-3.06, "Measurement," and Section 84-3.07, "Payment," of the Standard Specifications.

The contract price paid per meter for temporary traffic stripe (tape) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying, maintaining and removing the temporary traffic stripe tape, complete in place, as shown on the plans, as specified in the Standard Specification and these special provisions, and as directed by the Engineer.

#### **10-1.14 TRAFFIC PLASTIC DRUMS**

Traffic plastic drums shall conform to the requirements for traffic control devices in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Traffic plastic drums shall be constructed of low-density polyethylene material and shall be flexible or collapsible upon impact by a vehicle. The traffic plastic drum shall have a weighted base that will separate from the drum. The base shall be of such shape as to preclude rolling upon impact by a vehicle. The base shall be of sufficient weight to maintain the drum in position and upright. The base or external ballast rings shall not exceed 101.6 mm in height, and drum rings shall not exceed 965.2 mm maximum in diameter. The base or external rings placed over and around the drum, resting on the pavement or ground shall contain the ballast for the drums. Ballast for drums shall be sand or water, except sand shall be used in areas susceptible to freezing. The base shall have drain holes to prevent the accumulation of water. Sand bags shall not be used as ballast for drums.

The body of the traffic plastic drum shall be of a fluorescent orange or predominately orange color. Drums shall be a minimum of 914.4 mm in height above the traveled way, and have at least an 457.2 mm minimum width, regardless of orientation.

The markings on drums shall be horizontal, circumferential, alternating orange and white reflective bands 101.6 to 152.4 mm wide. Each drum shall have a minimum of 2 orange and 2 white bands. The top of the uppermost reflective band shall be no lower than 152.4 mm from the top of the drum. Any non-reflective spaces between the bands shall not exceed 50.8 mm in width. The reflective sheeting shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials," elsewhere in these special provisions.

Only one type of traffic plastic drum shall be used on the project. The type of traffic plastic drum proposed for use on the project shall be submitted to the Engineer for approval, prior to placement on the project.

In curvilinear alignment traffic plastic drums shall be used only on one side of the traveled way. Traffic plastic drums shall be placed on the alignment and location shown on the plans, or directed by the Engineer. Traffic plastic drums shall be placed uniformly, straight on tangent alignment and on a true arc on curved alignment. All layout work necessary to place the traffic plastic drums to the proper alignment shall be performed by the Contractor.

If traffic plastic drums are displaced or are not in an upright position, from any cause, the traffic plastic drums shall immediately be replaced or restored to their original location, in an upright position, by the Contractor.

At the option of the Contractor, where portable delineators, cones or Type I or II barricades are specified in the specifications or shown on the plans, traffic plastic drums may be used in place of those portable delineators, cones or Type I or II barricades.

At the completion of the project, traffic plastic drums shall become the property of the Contractor and removed from the site of the work.

Traffic plastic drums will be measured as units from actual count of the number of traffic plastic drum designated on the plans or ordered by the Engineer. After initial placement of traffic plastic drums, and if ordered by the Engineer, the traffic plastic drums shall be moved from location to location and the cost thereof will be paid for as extra work as provided in Section 4-1.03D. Traffic plastic drums which are used as part of traffic control system in place of cones, delineators or barricades or which are used in accordance with the requirements of "Public Safety" elsewhere in these special provisions or which are placed in excess of the number specified or shown will not be included in the count of traffic plastic drums to be paid for.

The contract unit price paid for traffic plastic drum shall include full compensation for furnishing all labor, materials (including ballast), tools, equipment, and incidentals, and for doing all the work involved in furnishing, placing, maintaining, repairing, replacing and removing the traffic plastic drum, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.15 TRAFFIC CONTROL SURVEILLANCE**

Attention is directed to 7-1.09, "Public Safety," of the Standard Specifications and to the Section entitled "Traffic Control System for Lane Closure" elsewhere in these special provisions, and these special provisions. Nothing in these special provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7-1.09.

In addition to the requirements elsewhere in these special provisions, the Contractor shall provide traffic control surveillance 24 hours per day, 7 days per week when the roadway width is reduced to 6.6 m wide.

Surveillance shall consist of providing one employee with a pickup truck at all times to maintain continuous traffic surveillance including patrolling the project and looking for any traffic related incident within the job limits that may delay public traffic and keeping the travel clear of any obstructions. Traffic handling devices damaged or destroyed shall immediately be temporarily replaced with flashers, flares, reflective devices or any other suitable means necessary to protect the traveling public until such time a more adequate replacement can be accomplished.

The pickup truck (907 Kg rating) shall be equipped with rotary warning light, arrow board, front bumper push bar with rubber face, cellular phone, winch rated at minimum of 3639 kg, trailer hitch and balls (4.76 cm and 5.0 cm), radios, and "CAUTION" sign attached to the tailgate, and any other items necessary to preserve and maintain traffic. The pickup truck shall have less than 80,465 km on the odometer. Other items carried on the pickup shall include unleaded gasoline, diesel fuel, funnel-flexible spout, first aid kit, fire extinguisher aggregate rating of at least 4-B, C units, pry bar-1 m or longer, water, 0.6 m push broom, square point shovel, fuses (highway flares-15 minutes), cones, hydraulic jack-2 ton floor, wood blocks, four way lug wrench(metric and standard), flashlight and spare batteries, booster cables, programmable scanners for scanning Caltrans and CHP, hydraulic jack-trolley type, heavy duty, 60 amp battery, mechanic's tool kit, 19 liter can with lid filled with absorbent material, and external speaker and address system.

The provisions in this section will not relieve the Contractor from his responsibility to provide such additional devices or take such measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

Full compensation for providing traffic control surveillance shall be considered as included in the contract lump sum price paid for traffic control system and no separate payment will be made therefor.

#### **10-1.16 PORTABLE CHANGEABLE MESSAGE SIGN**

Portable changeable message signs shall be furnished, placed, operated, and maintained during each lane, ramp, or shoulder closure and detour to next ramp closure, for stage construction and for truck brake inspection at locations directed by the Engineer and shall conform to the provisions of Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.



The number of portable changeable message signs required at any one time will be determined by the number of lane, ramp, or shoulder closures and detour to the next ramp closures that the Contractor determines are necessary for his operations. Two portable changeable message signs shall be in operation at all times for stage construction and one portable changeable message sign shall be in operation at all times for brake inspection.

Portable changeable message signs will be paid for on a lump sum basis.

The contract lump sum price paid for portable changeable message sign shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in furnishing, placing, operating, maintaining, repairing, replacing, changing messages daily as requested by the Engineer, transporting from location to location, and removing the portable changeable message signs, complete in place, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Attention is directed to "Maintaining Traffic" of these special provisions concerning the use of the portable changeable message signs.

#### **10-1.17 PORTABLE RADAR TRAILER**

Portable radar trailer shall be furnished, placed, operated, and maintained during all work that requires a lane closure at locations directed by the Engineer.

Each portable radar trailer shall consist of a traffic type radar, a controller unit, a power supply and a structural support system all mounted on a trailer. The unit shall be assembled to form a complete self-contained portable radar trailer, which can be delivered to the site of the work and placed in immediate operation. The trailer shall be equipped so that it can be leveled and plumbed.

The radar shall be capable of determining the speed of approaching vehicles to within 2 MPH (3.2 KPH) and shall display that speed within 1 second such that it is legible from a distance of 150 m, at noon on a cloudless day, by persons with vision corrected to 20/20.

After initial placement, the portable radar trailer shall be moved from location to location as directed by the Engineer.

Portable radar trailers will be paid for as units from actual count.

The contract unit price paid for portable radar trailer shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, placing, operating, maintaining, repairing, replacing, transporting from location to location, and removing the portable radar trailers, complete in place, as specified in these special provisions, and as directed by the Engineer.

#### **10-1.18 TEMPORARY RAILING**

Temporary railing (Type K) shall be placed as shown on the plans, specified in the Standard specifications or in these special provisions or ordered by the Engineer, and shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

The fourth paragraph of Section 12-4.01, "Measurement and Payment," of the Standard Specifications is amended to read:

When the Engineer's Estimate includes a contract item for temporary railing (Type K), the temporary railing (Type K) will be measured by the meter along the top of the railing, at each location shown on the plans, specified, or ordered by the Engineer. If the Engineer orders a lateral move of the temporary railing (Type K), and the repositioning is not shown on the plans, moving the temporary railing will be paid for as extra work as provided in Section 4-1.03D and the temporary railing will not be measured in the new position. Temporary railing (Type K) placed in excess of the length shown, specified, or ordered will not be paid for. The contract price paid per meter for temporary railing (Type K) shall include full compensation for furnishing all labor, materials (including reinforcement and Type P marker panels), tools, equipment and incidentals, and for doing all the work involved in furnishing, placing, maintaining, repairing, replacing, and removing the temporary railing, including excavation and backfill, drilling holes and bonding threaded rods or dowels when required, removing threaded rods or dowels and filling the drilled holes with mortar, furnishing and installing reflectors, and moving and replacing removable panels as required, complete in place, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

Reflectors on temporary railing (Type K) shall conform to the provisions in "Approved Traffic Products" of these special provisions.

Temporary railing (Type K), conforming to the details shown on 1995 Standard Plan T3 or 1992 Standard Plan T3, may be used. Temporary railing (Type K) fabricated prior to January 1, 1993, and conforming to 1988 Standard Plan B11-30 may be used, provided the fabrication date is printed on the required Certificate of Compliance.

The Contractor's attention is directed to the provisions in "Public Safety" of these special provisions.

Temporary railing (Type K) placed in conformance with the provisions in "Public Safety" of these special provisions will be neither measured nor paid for.

### **10-1.19 TEMPORARY CRASH CUSHION MODULE**

This work shall consist of furnishing, installing and maintaining sand filled temporary crash cushion modules in groupings or arrays at each location shown on the plans, specified in the special provisions or directed by the Engineer. The grouping or array of sand filled modules shall form a complete sand filled temporary crash cushion in accordance with the details shown on the plans and these special provisions.

Attention is directed to "Public Safety" and "Temporary Railing" of these special provisions.

#### **GENERAL**

Whenever the work or the Contractor's operations establishes a fixed obstacle, the exposed fixed obstacle shall be protected with a sand filled temporary crash cushion. The sand filled temporary crash cushion shall be in place prior to opening the lanes adjacent to the fixed obstacle to public traffic.

Sand filled temporary crash cushions shall be maintained in place at each location, including times when work is not actively in progress. Sand filled temporary crash cushions may be removed during a work period for access to the work provided that the exposed fixed obstacle is 4.6 m or more from a lane carrying public traffic and the temporary crash cushion is reset to protect the obstacle prior to the end of the work period in which the fixed obstacle was exposed. When no longer required, as determined by the Engineer, sand filled temporary crash cushions shall be removed from the site of the work.

#### **MATERIALS**

At the Contractor's option, the modules for use in sand filled temporary crash cushions shall be either Energite III Inertial Modules, Fitch Inertial Modules manufactured after March 31, 1997, or equal:

Energite III Inertial Modules manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076, Telephone 1-312-467-6750, FAX 1-800-770-6755.

Distributor (Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 1-800-884-8274, FAX 1-916-387-9734

Distributor (Southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone 1-800-222-8274, FAX 1-714-937-1070.

Fitch Inertial Modules, national distributor; Roadway Safety Service, Inc., 1050 North Rand Road, Wauconda, IL 60084, Telephone 1-800-426-0839, FAX 1-847-487-9820.

Distributor: Singletree Sales Company, 1533 Berger Drive, San Jose, CA 95112, Telephone 1-800-822-7735, FAX 1-408-287-1929.

Modules contained in each temporary crash cushion shall be of the same type at each location. The color of the modules shall be the standard yellow color as furnished by the vendor, with black lids. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects. The modules need not be new. Good used undamaged modules conforming to color and quality of the types specified above may be utilized. If used Fitch modules requiring a seal are furnished, the top edge of the seal shall be securely fastened to the wall of the module by a continuous strip of heavy duty tape.

Modules shall be filled with sand in accordance with the manufacturer's directions, and to the sand capacity in kilograms for each module as shown on the plans. Sand for filling the modules shall be clean washed concrete sand of commercial quality. At the time of placing in the modules, the sand shall contain not more than 7 percent water, as determined by California Test 226.

Modules damaged due to the Contractor's operations shall be repaired immediately by the Contractor at the Contractor's expense. Modules damaged beyond repair, as determined by the Engineer, due to the Contractor's operations shall be removed and replaced by the Contractor at the Contractor's expense.

#### **INSTALLATION**

Temporary crash cushion modules shall be placed on movable pallets or frames conforming to the dimensions shown on the plans. The pallets or frames shall provide a full bearing base beneath the modules. The modules and supporting pallets or frames shall not be moved by sliding or skidding along the pavement or bridge deck.

A Type R or P marker panel shall be attached to the front of the crash cushion as shown on the plans, when the closest point of crash cushion array is within 3.6 m of the traveled way. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods approved by the Engineer.

At the completion of the project, temporary crash cushion modules, sand filling, pallets or frames, and marker panels shall become the property of the Contractor and shall be removed from the site of the work. Temporary crash cushion modules shall not be installed in permanent work.

#### **MEASUREMENT AND PAYMENT**

Temporary crash cushion modules placed in accordance with the provisions in "Public Safety" elsewhere in these special provisions will not be measured nor paid for.

#### **10-1.20 EXISTING HIGHWAY FACILITIES**

The work performed in connection with various existing highway facilities shall conform to the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Plans of the existing bridges may be requested by fax from the Office of Structure Maintenance and Investigations, 1801 30th Street, Sacramento, CA, Fax (916) 227-8357.

Plans of existing bridges available to the Contractor are reproductions of the original contract plans with significant changes noted and working drawings and do not necessarily show normal construction tolerances and variances. Where dimensions of new construction required by this contract are dependent on the dimensions of existing bridges, the Contractor shall verify the controlling field dimensions and shall be responsible for adjusting dimensions of the work to fit existing conditions.

##### **10-1.20A REMOVE UNSOUND CONCRETE**

This work shall consist of the removal and disposal of unsound portland cement concrete, unsound epoxy concrete patches and all asphalt concrete patches from the decks, curbs and railings of bridges. Unsound concrete shall be removed as shown on the plans and to the limits designated by the Engineer.

Unsound concrete is generally that concrete which emits a relatively dead or hollow sound when a chain is dragged over its surface or its surface is tapped with a metal tool. Concrete encasing corroded reinforcing steel beyond the limits identified by the sound may be considered as unsound concrete. The Engineer will determine the soundness of all concrete.

Equipment and tools shall not be used to remove unsound concrete which, in the opinion of the Engineer, cause the removal of excess quantities of sound concrete along with the unsound concrete. Equipment used shall be fitted with suitable traps, filters, drip pans or other devices to prevent oil or other deleterious matter from being deposited on the deck.

Operations pertaining to removal of unsound concrete shall be stopped while trains are passing beneath the bridge.

After the removal of unsound concrete has been completed, any existing reinforcing steel which has been exposed shall be restored to position and blocked and tied in accordance with the provisions in Section 52, "Reinforcement," of the Standard Specifications.

Reinforcing steel that has been damaged to the extent that its usefulness is destroyed as a result of the Contractor's operations, shall be repaired or replaced by the Contractor at the Contractor's expense.

Pay quantities determined by the methods of measurement specified in this section will not necessarily be equal to the quantities computed from the actual dimensions of the concrete actually removed. No allowance will be made in the event that the pay quantities do not equal the volume of concrete actually removed.

Removing unsound concrete will be paid for as extra work in accordance with the provisions in Section 4-1.03D of the Standard Specifications.

##### **10-1.20B OBLITERATE SURFACING**

Existing surfacing, when no longer required for the passage of public traffic, shall be obliterated at the locations shown on the plans.

Surfacing shall not be obliterated by the earth cover method.

Obliteration shall consist of rooting, plowing, pulverizing or scarifying the existing surfacing as specified in Section 15-2.02A, "Obliterating Roads and Detours," of the Standard Specifications.

##### **10-1.20C REMOVE DELINEATORS, OBJECT MARKERS AND MILEPOST MARKERS**

Existing delineators, object markers and milepost markers, when directed by the Engineer, shall be removed and disposed of.

Full compensation for removing and disposing of delineators, object markers and milepost markers, shall be considered as included in the contract prices paid for delineator (Class 2), object marker (Type L-1) or kilometer post marker and no separate payment will be made therefor.

#### **10-1.20D REMOVE METAL BEAM GUARD RAILING**

Existing metal beam guard railing, where shown on the plans to be removed, shall be removed and disposed of.

Existing concrete anchors shall be removed completely. Full compensation for removing concrete anchors shall be considered as included in the contract price paid per meter for remove metal beam guard railing and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies shall be considered as included in the contract price paid per meter for remove metal beam guard railing and no separate payment will be made therefor.

#### **10-1.20E REMOVE DOUBLE METAL BEAM BARRIER**

Existing double metal beam barrier, where shown on the plans to be removed, shall be removed and disposed of.

Existing concrete anchors shall be removed completely. Full compensation for removing concrete anchors shall be considered as included in the contract price paid per meter for remove double metal beam barrier and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies shall be considered as included in the contract price paid per meter for remove double metal beam barrier and no separate payment will be made therefor.

#### **10-1.20F REMOVE DRAINAGE FACILITIES**

Existing flared end sections, inlets, and downdrains, where shown on the plans to be removed, shall be completely removed and disposed of.

#### **10-1.20G REMOVE TRAFFIC STRIPES**

Traffic stripes to be removed shall be removed at the locations shown on the plans and at the locations designated by the Engineer.

The first paragraph of Section 15-2.02B, "Traffic Stripes and Pavement Markings," of the Standard Specifications is amended to read:

**15-2.02B Traffic Stripes and Pavement Markings.**— Traffic stripes and pavement markings shall be removed by any method that does not materially damage the existing pavement. Pavement marking images shall be removed in such a manner that the old message cannot be identified. Where grinding is used, the pavement marking image shall be removed by grinding a rectangular area. The minimum dimensions of the rectangle shall be the height and width of the pavement marking. Residue resulting from removal operations shall be removed from pavement surfaces by sweeping or vacuuming before the residue is blown by the action of traffic or wind, migrates across lanes or shoulders, or enters into drainage facilities.

Section 15-2.07, "Payment," of the Standard Specifications is amended by adding the following paragraph:

Full compensation for any additional grinding outside the limits of the existing pavement marking image to obtain a rectangular area shall be considered as included in the contract price paid for the item of work involved and no additional compensation will be allowed therefor.

Nothing in these special provisions shall relieve the Contractor from the Contractor's responsibilities as provided in Section 7-1.09, "Public Safety," of the Standard Specifications.

#### **10-1.20H REMOVE ROADSIDE SIGNS**

Existing roadside signs, at locations shown on the plans to be removed, shall be removed and disposed of.

Existing roadside signs shall not be removed until replacement signs have been installed or until the existing signs are no longer required for the direction of public traffic, unless otherwise directed by the Engineer.

#### **10-1.20I REMOVE ASPHALT CONCRETE DIKE**

Existing asphalt concrete dike, where shown on the plans to be removed, shall be removed.

The dike shall be removed in such a manner so that the surfacing which is to remain in place is not damaged.

The dike shall be disposed of outside the highway right of way. The disposal shall conform to the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

#### **10-1.20J REMOVE ASPHALT CONCRETE OVERSIDE DRAIN**

Existing asphalt concrete overside drains, where shown on the plans to be removed, shall be removed.

The asphalt concrete overside drains shall be disposed of outside the highway right of way. The disposal shall conform to the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

#### **10-1.20K REMOVE CONCRETE DECK SURFACE**

This work shall consist of removing portions of the portland cement concrete deck surface to a depth of 20 mm, abrasive blasting and blowing clean the deck surface as shown on the plans and as described in these special provisions.

The existing concrete barrier on the bridge deck shall remain in place.

The method of concrete removal shall be selected by the Contractor except that scarifiers, coldplaners, scabblers and similar types of equipment or procedures that leave fractured aggregate or otherwise damage the concrete surface to remain shall not be used. Cold milling equipment may be used only when the depth of concrete removal is 25 mm or less.

Coarse aggregate remaining above the specified removal depth shall be firmly embedded in the remaining concrete.

High pressure water jet equipment, when used, shall have rotating jets and be rated at no less than 200 MPa. Adequate means shall be used to prevent water from the jetting operation from flowing across traffic lanes, or flowing into gutters or waterways.

Cold milling equipment shall have the capability to 1) remove concrete a minimum of 6 mm, 2) follow the contour of the deck, 3) irregular cut to 6 mm tolerance, 4) maintain a 4 mm grade tolerance; and shall have the following features:

- 1) 4 riding tracks.
- 2) An automatic grade control system with an electric averaging system with 3 sonar sensors on each side of each track.
- 3) Front loading conveyer system.
- 4) A drum that operates in an up-milling direction.
- 5) Bullet teeth with tungsten carbide steel cutting tips. The tungsten cylinder shall be embedded in a cylindrical trough.
- 6) 6 mm tool spacing.
- 7) Maximum operating weight of 25,400 kilograms.

The cold milling equipment shall have new teeth at the beginning of the job, and the teeth shall be replaced every 8 hours of operation.

After the deck has been blown clean, unsound concrete shall be removed, as specified under "Remove Unsound Concrete" of these special provisions. When the removal of unsound concrete has been completed, the entire surface shall be abrasive blast cleaned of all surface contaminants. The deck shall be dry when blast cleaning is performed.

If the surface becomes contaminated at any time prior to placing the overlay, the surface shall be cleaned by abrasive blasting.

Where abrasive blasting is being performed within 3 m of a lane occupied by public traffic, the residue including dust shall be removed immediately after contact between the abrasive and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the abrasive blasting operation.

Nothing in these special provisions shall relieve the Contractor from his responsibilities as provided in Section 7-1.09, "Public Safety," of the Standard Specifications.

Equipment shall be fitted with suitable traps, filters, drip pans or other devices, as necessary, to prevent oil or other deleterious material from being deposited on the deck.

All removed materials shall become the property of the Contractor and shall be disposed of in accordance with Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Remove concrete deck surface will be measured by the square meter of concrete deck surface to be removed based on dimensions shown on the plans.

The contract price paid per square meter for remove concrete deck surface shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing concrete deck surface, except remove unsound concrete, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.20L RECONSTRUCT CHAIN LINK FENCE**

Existing chain link fence and gates shall be removed and reconstructed as shown on the plans.

Reconstruct chain link gates will be measured and paid for as reconstruct chain link fence.

New posts shall be furnished and used to reconstruct chain link fence and gates. Removed posts shall be disposed of. New posts shall conform to the provisions in Section 80-4.01A, "Posts and Braces," of the Standard Specifications. Full compensation for furnishing and installing new posts, and for removing and disposing of removed posts shall be considered as included in the contract price paid per meter for reconstruct chain link fence and no separate payment will be made therefor.

Fence removed in excess of that required for reconstructing chain link fence shall be disposed of. Full compensation for removing and disposing of excess fence shall be considered as included in the contract price paid per meter for reconstruct chain link fence and no separate payment will be made therefor.

#### **10-1.20M RECONSTRUCT MODIFIED METAL BEAM GUARD RAILING (TYPE A)**

Existing modified metal beam guard railing (Type A), where shown on the plans to be reconstructed, shall be reconstructed as shown on the plans.

Attention is directed to "Order of Work" of these special provisions regarding the reconstruction of guard railing at locations exposed to public traffic.

Existing modified metal beam guard railing (Type A) shall be reconstructed by removing the rail elements and blocks from the existing posts and reinstall the removed rail elements and blocks on the same posts at the new elevation shown on the plans. All components of the removed guard railing that are not used in the reconstruction work shall be disposed of.

Full compensation for disposing of components not used in the reconstruction work shall be considered as included in the contract price paid per meter for reconstruct modified metal beam guard railing (Type A) and no separate payment will be made therefor.

#### **10-1.20N ADJUST INLETS**

Existing pipe and drainage inlets shall be adjusted as shown on the plans.

Portland cement concrete shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications, or may be produced from commercial quality concrete containing not less than 350 kilograms of cement per cubic meter.

Adjustment of inlets shall be performed prior to paving and shall be limited to the area to be paved or resurfaced during the working day in which the adjustment is performed. The top of the inlet grate or cover shall be adequately protected from the asphalt concrete during paving operations by means of plywood covers, or by other methods approved by the Engineer. All excess paving material shall be removed prior to rolling.

#### **10-1.20O MODIFY WRECKER ANCHOR**

Existing wrecker anchor shall be modified as shown on the plans.

Existing plates shall be removed and disposed of and existing drain shall be extended.

New steel pipe and plates shall conform to the provisions in Section 75-1.02 "Miscellaneous Iron and Steel" of the Standard Specifications.

Full compensation for removing and disposing of existing plates, extending existing drain, and furnishing and installing steel pipe and plates shall be considered as included in the contract unit price paid for modify wrecker anchor and no additional compensation will be allowed therefor.

#### **10-1.20P PLASTIC PIPE-LINER**

Plastic pipe-liner shall be furnished and installed in existing culverts at the locations shown on the plans and in accordance with the details shown on the plans and these special provisions.

Plastic pipe-liner shall have a nominal diameter, thickness, and maximum Standard Dimension Ratio (when applicable) as shown on the plans or specified.

Plastic pipe-liner shall be high density polyethylene (HDPE) solid wall pipe conforming to the requirements of ASTM Designation: F 714.

In accordance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, a Certificate of Compliance shall be furnished to the Engineer for the plastic pipe-liner.

Plastic pipe-liner joints shall be joint systems or couplers conforming to the manufacturer's requirements. Joint systems or couplers shall perform the intended function and comply with the "Standard" shear strength and watertightness requirements set forth in Section 61-1.02, "Performance Requirements for Culvert and Drainage Pipe Joints," of the Standard Specifications. The Contractor shall furnish to the Engineer a Certificate of Compliance in accordance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, that the material being furnished conforms to the joint property requirements as described above.

The existing culvert shall be cleaned thoroughly prior to inserting the plastic pipe-liner. Earthy material, trash, cuttings and other waste materials removed from existing culverts shall be disposed of in accordance with

Contract No. «Dist»-«Contract\_No»

Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. During the installation of the plastic pipe-liner, the Contractor shall provide all necessary protection to prevent damage to the plastic pipe-liner and the existing culvert.

Cement mortar conforming to the provisions in Section 65-1.06, "Joints," of the Standard Specifications, shall be placed to form a seal between the existing culvert and the plastic pipe-liner, as shown on the plans. Pipe for weep tube shall be commercial quality, rigid, plastic pipe.

Paper or cloth wadding shall be placed not less than 150 mm from each end of the existing pipe, as shown on the plans, to retain the mortar during sealing operations.

The length of plastic pipe-liner to be paid for will be the slope length designated by the Engineer. Pipe placed in excess of the length designated will not be paid for.

The contract price paid per meter for the different sizes of plastic pipe-liner shall include full compensation for furnishing all labor, materials (including mortar and weep tube pipe), tools, equipment, and incidentals, and for doing all the work involved in installing plastic pipe-liner, complete in place, including mortaring the ends of the plastic pipe liner, cleaning of existing culverts and disposal of residue from cleaning, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for cutting, removing, and disposing of a portion of existing culverts where pipe-liner is to be installed shall be considered as included in the contract price paid per meter for the different sizes of plastic pipe-liner and no additional compensation will be allowed therefor.

#### **10-1.20Q REMODEL INLET**

Existing drainage inlets shall be remodeled as shown on the plans and in accordance with the provisions in Section 15-2.05, "Reconstruction," of the Standard Specifications.

Portland cement concrete shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications, or may be produced from commercial quality concrete containing not less than 350 kilograms of cement per cubic meter.

Steel plate covers and frames shall conform to the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications.

Where inlets are located in areas to be paved or surfaced, no individual structure shall be constructed to final grade until the paving or surfacing has been completed immediately adjacent to the structure.

Full compensation for minor concrete, steel plate covers and frames shall be considered as included in the contract unit price paid for remodel inlet and no separate payment will be made therefor.

#### **10-1.20R RUMBLE STRIPS IN PORTLAND CEMENT CONCRETE PAVEMENT (GROUND-IN)**

Rumble strips in portland cement concrete pavement (ground-in) shall consist of constructing rumble strip depressions in portland cement concrete shoulders in accordance with the details shown on the plans and these special provisions.

Rumble strips shall not be installed on Bridges.

Should the methods used or equipment furnished by the Contractor fail to produce rumble strip depressions without damaging the concrete pavement that is to remain in place, the rumble strip operation shall be discontinued. The Contractor shall provide other suitable equipment, or modify the equipment or method of constructing the rumble strip depressions.

Constructing rumble strips shall be performed without damage to the new or existing traffic stripes that are to remain in place. Damage to existing traffic stripes, which are to remain in place, shall be replaced at the Contractor's expense and will not be measured nor paid for.

Residue from constructing rumble strip depressions shall be immediately vacuumed up and shall be disposed of outside the highway right of way as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Rumble strip depressions shall not vary from the required dimensions by more than 10 percent.

Rumble strips will be measured by the meter, along each shoulder on which the rumble strips are constructed, with no deduction for required gaps at off-ramps and bridges.

The contract price paid per meter for rumble strips in portland cement concrete pavement (ground-in) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the rumble strips, including vacuuming up and disposing of the residue, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **10-1.20S COLD PLANE ASPHALT CONCRETE PAVEMENT**

Existing asphalt concrete pavement shall be cold planed at the locations and to the dimensions shown on the plans.

Planing asphalt concrete pavement shall be performed by the cold planing method. Planing of the asphalt concrete pavement shall not be done by the heater planing method.

Cold planing machines shall be equipped with a cutter head not less than 750 mm in width and shall be operated so as not to produce fumes or smoke. The cold planing machine shall be capable of planing the pavement without requiring the use of a heating device to soften the pavement during or prior to the planing operation.

The depth, width and shape of the cut shall be as indicated on the typical cross sections or as directed by the Engineer. The final cut shall result in a uniform surface conforming to the typical cross sections. The outside lines of the planed area shall be neat and uniform. Planing asphalt concrete pavement operations shall be performed without damage to the surfacing to remain in place.

Planed widths of pavement shall be continuous except for intersections at cross streets where the planing shall be carried around the corners and through the conform lines. Following planing operations, a drop-off of more than 45 mm will not be allowed at any time between adjacent lanes open to public traffic.

Where transverse joints are planed in the pavement at conform lines no drop-off shall remain between the existing pavement and the planed area when the pavement is opened to public traffic. If asphalt concrete has not been placed to the level of existing pavement before the pavement is to be opened to public traffic a temporary asphalt concrete taper shall be constructed. Asphalt concrete for temporary tapers shall be placed to the level of the existing pavement and tapered on a slope of 1:200 (Vertical: Horizontal) or flatter to the level of the planed area.

Asphalt concrete for temporary tapers shall be commercial quality and may be spread and compacted by any method that will produce a smooth riding surface. Temporary asphalt concrete tapers shall be completely removed, including the removal of all loose material from the underlying surface, before placing the permanent surfacing. The removed material shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The material planed from the roadway surface, including material deposited in existing gutters or on the adjacent traveled way, shall be removed and disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications. Removal operations of cold planed material shall be concurrent with planing operations and follow within 15 m of the planer, unless otherwise directed by the Engineer.

Cold plane asphalt concrete pavement will be measured by the square meter. The quantity to be paid for will be the actual area of surface cold planed irrespective of the number of passes required to obtain the depth shown on the plans.

The contract price paid per square meter for cold plane asphalt concrete pavement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in cold planing asphalt concrete surfacing and disposing of planed material, including furnishing the asphalt concrete for and constructing, maintaining, removing, and disposing of temporary asphalt concrete tapers, as specified in these special provisions and as directed by the Engineer.

### **10-1.20T REMOVE CONCRETE**

Concrete, designated on the plans to be removed, shall be removed.

The pay quantities of concrete curb and concrete barrier to be removed will be measured by the meter, measured before removal operations.

The pay quantities of concrete sidewalk to be removed will be measured by the square meter, measured before removal operations.

Concrete removed shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

### **10-1.20U REMOVE SALT BUNKER**

Existing steel salt bunker shown on the plans to be removed, shall be removed.

Existing concrete footings shall be removed to a depth of not less than 0.3-m below subgrade or 0.3-m below finished grade, whichever is greater in depth. Full compensation for removing concrete footings shall be considered as included in the contract unit price paid for remove salt bunker and no separate payment will be made therefor.

The removed salt bunker and concrete footings shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

### **10-1.20V CAP INLETS**

Existing pipe and drainage inlets where shown on the plans to be capped, shall be capped and the bottoms of the inlets shall be rounded with portland cement concrete as shown on the plans.



Portland cement concrete shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications, or may be produced from commercial quality aggregates and cement containing not less than 350 kg of cement per cubic meter.

Inlets shall be removed to a depth of at least 0.3-m below the grading plane.

Concrete removal shall be performed without damage to any portion that is to remain in place. All damage to the existing concrete, which is to remain in place, shall be repaired by the Contractor to a condition equal to that existing prior to the beginning of removal operations. The repair of existing concrete damaged by the Contractor's operations shall be at the Contractor's expense.

Existing reinforcement that is to be incorporated in new work shall be protected from damage and shall be thoroughly cleaned of all adhering material before being embedded in new concrete.

The quantity of capping inlets will be determined as units from actual count.

The contract unit price paid for cap inlet shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in capping inlets, including removing portions of inlets, rounding bottoms of inlets, minor concrete, bar reinforcing steel, and structure excavation and structure backfill, as shown on the plans, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

#### **10-1.20W BRIDGE REMOVAL (PORTION)**

Removing portions of bridge shall conform to the requirements in Section 15-4, "Bridge Removal," of the Standard Specifications and these special provisions.

### **ALTA ROAD UNDERCROSSING BRIDGE NUMBER 19-0111**

Remove portions of the existing concrete deck as shown on the plans, existing reinforcement to remain in place.

All removed materials that are not to be salvaged or used in the reconstruction shall become the property of the Contractor and shall be disposed outside the highway right of way in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

#### **10-1.21 CLEARING AND GRUBBING**

Clearing and grubbing shall conform to the provisions in Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

Vegetation shall be cleared and grubbed only within the excavation and embankment slope lines.

At locations where there is no grading adjacent to a bridge or other structure, clearing and grubbing of vegetation shall be limited to 1.5 m outside the physical limits of the bridge or structure.

Existing vegetation outside the areas to be cleared and grubbed shall be protected from injury or damage resulting from the Contractor's operations.

Trees greater than 200 mm in diameter shall become the property of the Contractor. Trees and shrubs less than 200 mm in diameter shall be chipped or shredded and stockpiled. The chipped or shredded material shall be spread within the Erosion Control (Mulch) areas or as directed by the Engineer. The chipped or shredded material shall not be substituted for Erosion Control (Mulch).

Activities controlled by the Contractor, except cleanup or other required work, shall be confined within the graded areas of the roadway.

Nothing herein shall be construed as relieving the Contractor of the Contractor's responsibility for final cleanup of the highway as provided in Section 4-1.02, "Final Cleaning Up," of the Standard Specifications.

#### **10-1.22 EARTHWORK**

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

Final excavation slopes shall be left in a roughened condition using a tracked vehicle or serration device. The use of cutting edges, such as grader blades, shall not be used for the final cutting of these slopes.

Embankment slopes shall be roughened using a tracked vehicle. The tracking shall be perpendicular to the slope.

Full compensation for roughening excavation slopes using a tracked vehicle or serration device and for roughening embankment slopes using a tracked vehicle shall be considered as included in the contract price paid per cubic meter for roadway excavation and no additional compensation will be allowed therefor.

Surplus excavated material shall become the property of the Contractor and shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

Where a portion of existing surfacing is to be removed, the outline of the area to be removed shall be cut on a neat line with a power-driven saw to a minimum depth of 50 mm before removing the surfacing. Full compensation for cutting existing surfacing shall be considered as included in the contract price paid per cubic meter for roadway excavation and no additional compensation will be allowed therefor.

#### **10-1.23 GEOSYNTHETIC REINFORCED EMBANKMENT**

Geosynthetic reinforced embankment shall consist of placing geosynthetic reinforcement material between layers of compacted soil in accordance with the details shown on the plans, as specified in Section 19 "Earthwork," of the Standard Specifications, these special provisions, and as directed by the Engineer. Only one type of geosynthetic reinforcement material shall be used for an entire embankment.

**MATERIAL CONFIGURATION SPECIFICATIONS.**--The geosynthetic reinforcement material shall be configured as a geosynthetic and shall meet the requirements described under "Material Specifications" found elsewhere in this section. The Engineer shall be furnished a Certificate of compliance according to the provisions found in Section 6-1.07, "Certificate of Compliance," of the Standard Specifications for the geosynthetic reinforcement material a minimum of one week prior to beginning placement of geosynthetic reinforcement material. The Certificate of Compliance shall be prepared and signed by a representative of the manufacturer who is a California-registered Civil Engineer.

Geosynthetic reinforcement material shall consist of material designed for use in subsurface geotechnical slope reinforcement applications. Geosynthetic reinforcement material shall be configured as a geogrid material. Geogrid shall have in addition to the requirements for geosynthetic reinforcement, a regular and defined open area. Geogrid shall obtain pullout resistance from the soil by a combination of soils shearing friction on the plane surfaces parallel to the direction of shearing and soils bearing on transverse grid surfaces normal to the direction of grid movement. The percentage of the open area for geogrids shall range from 50 to 90 percent of the total projection of a section of the material.

Geosynthetic reinforcement material shall meet the following requirements in addition to the requirements described under "Materials Specifications" elsewhere in this section:

1. Long Term Design Strength (LTDS) for geosynthetic reinforcement material shall be equal to or greater than values shown on the plans or elsewhere in these specifications as determined by Geosynthetic Research Institute (GRI) Test Methods. LTDS for geogrid reinforcement and geotextile reinforcement shall be determined by Standard Practice GRI G4 (a) and (b) and GRI GT7, respectively. These values are minimum average roll values.

Long Term Design Strength is the strength of the geogrid or the geotextile calculated by applying all partial factors of safety in accordance with GRI Standard Practice GG4 (a) and (b) or GT7. The factor of safety for creep deformation shall be determined for a 75-year design life as determined by GRI G4 (a) and (b) for geogrids or GRI GT7 for geotextiles. The 75-year design life strength is determined from the creep curve which becomes asymptotic to a constant strain line of 10 percent or less.

In the absence of specific test data, the partial factor of safety default values (installation damage, creep deformation, chemical degradation, biological degradation, and joint) as indicated in the Standard Practice GRI G4 (a) and (b) and GRI GT7 shall be applied to the calculations of the LTDS.

2. Geosynthetic reinforcement material shall be resistant to naturally occurring alkaline and acidic soil conditions, and to attack by bacteria.

All test results which contributed to the calculations of the LTDS shall be submitted to the Engineer no less than one week prior to beginning placement of the geosynthetic reinforced embankment. All test results which contribute to the calculations of the LTDS shall be prepared and signed by a California-registered Civil Engineer.

**MATERIAL.**--Geosynthetic reinforcement material shall consist of high density polyethylene, polypropylene, high density polypropylene sheets, high tenacity polyester yarn, or polyaramide and shall meet the applicable material requirements found below. Geosynthetic reinforcement material shall consist of main and secondary reinforcement layers.

**High Density Polyethylene.**--Geosynthetic reinforcement material consisting of high density polyethylene shall meet or exceed the following material requirements:

- 1) Be manufactured from high density polyethylene (HDPE) which conforms to ASTM Method D 1248.
- 2) Shall have a LTDS in the primary strength direction greater than or equal to 15.0 kilo-Newtons per meter.

**Polypropylene.**--Geosynthetic reinforcement material consisting of polypropylene or high-density polypropylene sheets shall meet or exceed the following material requirements:

- 1) Shall meet the requirements of ASTM Designation: D 4101, Group 1/Class1/Grade 2.
- 2) Shall have a LTDS in the primary strength direction greater than or equal to 15.0 kilo-Newtons per meter.

**High Tenacity Polyester Encapsulated.**--Geosynthetic reinforcement material consisting of high tenacity polyester yarn shall meet or exceed the following material requirements:

- 1) Be manufactured from high tenacity polyester yarn as determined by ASTM Designation: D 629. In addition to meeting the requirements for geosynthetic, geogrid shall be encapsulated in an acrylic latex coating or similar.
- 2) Shall have a LTDS in the primary strength direction greater than or equal to 15.0 kilo-Newtons per meter.

**Polyaramides.**--Geosynthetic reinforcement material consisting of polyaramide shall meet or exceed the following material requirements:

- 1) Be manufactured from high tenacity polyester yarn as determined by ASTM Designation: D 629.
- 2) Shall have a LTDS in the primary strength direction greater than or equal to 15.0 kilo-Newtons per meter.

**EMBANKMENT BACKFILL.**--The backfill material used in the geosynthetic reinforced embankment shall consist of imported material and/or material developed on site. The backfill shall be reasonably free from organic or other deleterious materials. If imported material is chosen, it shall conform to the following:

PROPERTY	VALUE	CA TEST NO.
Percent passing	Gradation	202
Sieve Size		
75-millimeters	100	
19-millimeters	70 - 100	
4.75-millimeters	20 - 80	
420-µm	0 - 70	
75-µm	0 - 55	
Sand Equivalent	10 minimum	217
Plasticity Index	20 maximum	204
pH	between 3 and 9	643

**HANDLING AND STORAGE.**--Geosynthetic reinforcement material shall be handled and stored in accordance with the manufacturer's recommendations and these special provisions. Geosynthetic reinforcement material shall be furnished in an appropriate protective cover which shall protect it from ultraviolet radiation and from abrasion during shipping and handling. Only as much geosynthetic reinforcement material shall be placed as can be placed and covered with backfill in the same work shift.

**CONSTRUCTION.**--The Contractor shall prepare the grade that is to receive the layers of geosynthetic reinforcement material to the compaction and elevation tolerances described in the Standard Specifications under Section 19-2.05, "Slopes," and these special provisions. The grade shall be free of loose or extraneous material and objects that may damage the geosynthetic reinforcement material during installation. Relative compaction of not less than 95 percent shall be obtained in the embankment foundation under the lowest layer of geosynthetic reinforcement material for a minimum depth of 0.15 meter.

The maximum loose thickness of each light of embankment material shall not exceed 0.3 m and shall be compacted to 90% Relative Compaction.

Geosynthetic reinforcement material shall be handled and placed in accordance with the manufacturer's recommendations and these special provisions. The geosynthetic reinforcement material shall be laid horizontally at the elevation specified on the plans, on compacted backfill from the required embedment length to the face of the embankment plus the length of the overhang as shown on the plans. The geosynthetic reinforcement material shall be placed in a wrinkle free manner, pulled taut, aligned, and anchored before backfill placement. Slack in geosynthetic reinforcement material shall be removed in a manner, and to such a degree, as approved by the Engineer. Geosynthetic reinforcement material shall be installed in a horizontal plane at the intervals, elevations, and for the minimum embedment length shown on the plans. Each

layer of geosynthetic reinforcement material shall not vary more than 0.15 meter from the theoretical horizontal plane established for that layer for the entire width and length of the reinforced reinforcement.

Geosynthetic reinforcement material shall be placed as shown on the plans and shall extend the full width of the reinforced embankment. Where the full embedment length of geosynthetic reinforcement material as shown on the plans cannot be achieved along the sides or for other limited areas of the reinforcement zone, the geosynthetic reinforcement material shall be trimmed as necessary to avoid the obstruction and to achieve the maximum embedment possible.

Geosynthetic reinforcement material shall be secured in place with staples, pins, sand bags, or backfill as required by construction conditions, weather conditions, or as directed by the Engineer to prevent the displacement of the geosynthetic reinforcement material during compaction and placement of the reinforcement material.

Geosynthetic reinforcement material shall not extend into the pavement structural section.

Each layer of geosynthetic reinforcement material shall be placed (unrolled) into the grade to form a continuous mat. Overlapping and splicing geosynthetic embankment material shall conform to the following:

Uniaxial geogrid and geotextile geotechnical fabric does not need to be overlapped along edges parallel to the direction of working tensile strength. Uniaxial geogrid and woven geotechnical fabric shall not be overlapped or spliced along edges perpendicular to the direction of working tensile strength, or as directed by the Engineer.

Biaxial geogrid shall be overlapped a minimum of 150 millimeters along edges parallel to the direction of working tensile strength, or as directed by the Engineer. Biaxial geogrid shall be overlapped a minimum of 1 meter along edges perpendicular to the direction of working tensile strength of reinforcement, or as directed by the Engineer.

A layer of soil a minimum of 100 millimeters in thickness shall be spread between uniaxial geogrid layers or woven geotechnical fabric layers in the area to be overlapped, or as directed by the Engineer.

If a drainage feature or other feature is shown on the plans within or adjacent to the geosynthetic reinforced embankment, the construction of that feature shall be done in a time sequence relative to the geosynthetic reinforced embankment as best meets the project requirements.

The geosynthetic reinforcement material shall be placed in such a manner that the direction of maximum strength is oriented perpendicular to the project centerline. The Contractor shall verify correct orientation of the geosynthetic reinforcement material. Each layer of geosynthetic reinforcement material shall be placed onto the embankment material to form a continuous mat. Adjacent strips of geosynthetic reinforcement material placed in this manner need not be overlapped.

During spreading and compacting of the backfill, at least 150 millimeters, measured vertically, of backfill shall be maintained between the geosynthetic reinforcement material and the Contractor's equipment. Equipment or vehicles shall not be operated or driven directly on the geosynthetic reinforcement material.

At locations where guard rail posts will later be placed at the top of the geosynthetic reinforced embankment and the geosynthetic reinforcement material would interfere with placement of such posts, prior to backfilling the Contractor shall be allowed to cleanly cut the reinforcement material of the affected layers into a cross-shaped pattern to aid the later placement of the guard rail posts. The dimensions of the precutting shall not exceed the post dimensions by greater than 750 millimeters.

Splicing of geosynthetic reinforcement material shall not be allowed.

If the geosynthetic reinforcement material is damaged during construction operations, the damaged sections shall be repaired, at the Contractor's expense, by placing sufficient additional geosynthetic reinforcement material to cover the damaged area and to meet the following overlap requirements:

- 1) Edges of geogrid perpendicular to centerline shall be overlapped for entire lengths by the small of: three aperture openings or 100 millimeters. Edges of geogrid parallel to centerline shall be joined using a mechanical connection described elsewhere in these special provisions.
- 2) Edges of geotextiles shall be overlapped a minimum of 150 millimeters on all sides.

**MEASUREMENT AND PAYMENT.**--Geosynthetic Reinforced Embankment will be measured and paid for by the square meter for the total area in each level (plan view) of the main geosynthetic reinforcement as shown on the plans and for any additional area as directed by the Engineer. Payment shall not include additional reinforcement required for overlaps.

The contract price paid per square meter of geosynthetic reinforced embankment shall include full compensation for furnishing all labor and materials, including tools and equipment, and incidentals, for developing, placing and compacting native and/or imported embankment backfill, and for doing all the work involved in placing the geosynthetic reinforcement layers complete and in place, including splicing, overlapping and anchoring as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for revisions to drainage systems or other facilities made necessary by the use of an alternative geosynthetic reinforcement material embankment material shall be considered as included in the contract price paid per square meter for geosynthetic reinforced embankment and no adjustment in compensation will be made therefor.

#### 10-1.24 CONTROLLED LOW STRENGTH MATERIAL

Controlled low strength material shall consist of a workable mixture of aggregate, cementitious materials and water, and shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications and these special provisions.

At the option of the Contractor, controlled low strength material may be used as structure backfill for pipe culverts, except that controlled low strength material shall not be used as structure backfill for culverts having a span greater than 6.1 m.

When controlled low strength material is used for structure backfill, the width of the excavation shown on the plans may be reduced so that the clear distance between the outside of the pipe and the side of the excavation, on each side of the pipe, is a minimum of 300 mm. This minimum may be reduced to 150 mm when, either the height of cover is less than or equal to 6.1 m or the pipe diameter or span is less than 1050 mm.

Controlled low strength material in new construction shall not be permanently placed higher than the basement soil. For trenches in existing pavements, permanent placement shall be no higher than the bottom of any existing pavement permeable drainage layer. If a drainage layer does not exist, permanent placement in existing pavements shall be no higher than 25 mm below the bottom of the existing asphalt concrete, or no higher than the top of base below the existing Portland cement concrete pavements. The minimum height that controlled low strength material shall be placed, relative to the pipe invert, is  $0.5D$  ( $D$ =Diameter) for rigid pipe and  $0.7D$  for flexible pipe.

When controlled low strength material is proposed for use, the Contractor shall submit a mix design and test data to the Engineer for approval prior to excavating the trench for which controlled low strength material is proposed for use. The test data shall demonstrate that the mix design provides:

- a) For pipe culverts having a height of cover of 6.1 m or less, a 28-day compressive strength between 345 and 690 kPa is required; for height of cover greater than 6.1 m, a minimum 28-day compressive strength of 690 kPa is required. Compressive strength shall be determined by ASTM Designation: D 4832, "Preparation and Testing of Soil-Cement Slurry Test Cylinders."
- b) When controlled low strength material is used as structure backfill for pipe culverts, the sections of pipe culvert in contact with the controlled low strength material shall meet the requirements of Chapter 850 of the Highway Design Manual using the minimum resistivity, pH, chloride content, and sulfate content of the hardened controlled low strength material. Minimum resistivity and pH shall be determined by California Test 643, the chloride content shall be determined by California Test 422 and the sulfate content shall be determined by California Test 417.
- c) Cement shall be any type of Portland cement conforming to the provisions of ASTM Designation: C 150; or any type of blended hydraulic cement conforming to either ASTM Designation: C 595M or the physical requirements of ASTM Designation: C 1157M. Testing of cement will not be required.
- d) Admixtures may be used in conformance with Section 90-4, "Admixtures," of the Standard Specifications. Chemical admixtures containing chlorides as Cl in excess of one percent by mass of admixture, as determined by California Test 415, shall not be used.

Materials for controlled low strength material shall be thoroughly machine-mixed in a pugmill, rotary drum, or other approved mixer. Mixing shall continue until the cementitious material and water are thoroughly dispersed throughout the material. Controlled low strength material shall be placed in the work within 3 hours after introduction of the cement to the aggregates.

Controlled low strength material shall be placed in a uniform manner that will prevent voids in, or segregation of, the backfill, and will not float or shift the culvert. Foreign material which falls into the trench prior to or during placing of the controlled low strength material shall be immediately removed.

When controlled low strength material is to be placed within the traveled way or otherwise to be covered by paving or embankment materials, the material shall achieve a maximum indentation diameter of 76 mm prior to covering and opening to traffic. Penetration resistance shall be as measured by ASTM Designation: C 6024, "Standard Test Method for Ball Drop on Controlled Low Strength Material to Determine Suitability for Load Application."

Controlled low strength material used as structure backfill for pipe culverts will be considered structure backfill for compensation purposes.

#### 10-1.25 SHOULDER BACKING

This work shall consist of constructing shoulder backing adjacent to the edge of the new surfacing in accordance with the details shown on the plans and these special provisions.

The material for shoulder backing shall be imported material conforming to the following grading and quality requirements:

Grading Requirement		Quality Requirements		
Sieve Sizes	Percentage Passing	Specification	California Test	Requirement
50-mm	100	Sand Equivalent	217	10 min.-36 max
25-mm	74 - 100	Resistance (R-value)	301	40 min.
4.75-mm	40 - 72	Crushed Particles	205	75% min.
600-µm	15 - 44			
75-µm	10 - 25			

Coarse aggregate (material retained on the 4.75 mm sieve) shall consist of material of which at least 75% by weight shall be crushed particles as determined by California Test 205.

The material for shoulder backing shall not be cinder type in nature.

The areas where shoulder backing is to be constructed shall be cleared of all weeds, grass and debris. Removed weeds and grass shall be disposed of uniformly over adjacent slope areas and removed debris shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

Shoulder backing material shall be thoroughly mixed with the basement material by scarifying or blading and then watered and rolled to form a smooth, firmly compacted surface. Watering shall conform to the provisions in Section 17, "Watering," of the Standard Specifications.

Shoulder backing material shall not be deposited on the new surfacing prior to placing it in final position, nor shall the shoulder backing material be bladed onto the new surfacing during mixing, watering, and blading operations.

Shoulder backing construction shall be completed along the edges of any portion of new surfacing within 5 days after completion of that portion of the new surfacing. Prior to opening a lane, adjacent to uncompleted shoulder backing, to uncontrolled public traffic, the Contractor shall furnish, place and maintain portable delineators and C31 "Low Shoulder" signs off of and adjacent to the new surfacing. Portable delineators shall be placed at the beginning and along the drop-off of the edge of pavement, in the direction of travel, at successive maximum intervals of 150 m on tangents and 60 m on curves. C31 signs shall be placed at the beginning and along the drop-off at successive maximum intervals of 600 m. The portable delineators and C31 signs shall be maintained in place at each location until shoulder backing is completed at that location. Portable delineators and signs shall conform to the requirements in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications, except the signs may be set on temporary portable supports or on barricades.

Quantities of imported material (shoulder backing) will be measured by the tonne in accordance with the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications, except that the mass of water in the aggregate will not be determined and no deduction will be made from the mass of material delivered to the work.

The contract price paid per tonne for imported material (shoulder backing) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing shoulder backing complete in place, including furnishing, placing, maintaining, and removing portable delineators, C31 signs and temporary supports or barricades for the signs, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### 10-1.26 ARRESTOR BED AGGREGATE

This work shall consist of furnishing, spreading, and shaping aggregate for the arrestor bed, as shown on the plans and as specified in these special provisions.

Aggregate for the arrestor bed shall be a hard, durable, uncrushed, rounded, stream run gravel, and shall be clean and free from organic material and other deleterious substances.

Aggregate for the arrestor bed shall conform to the following grading and quality requirements:

Grading Requirement		Quality Requirements		
Sieve Sizes	Percentage Passing	Specification	California Test	Requirement
37.5-mm	100	Sand Equivalent	217	65 min.
25-mm	90 - 100	Durability Index	229	60 min.
19-mm	0 - 10			
4.75-mm	0 - 2			

Aggregate for the arrestor bed shall contain no mechanically fractured faces and the percentage of naturally fractured faces shall not exceed 15 percent of the total surface area of the aggregate.

Aggregate for the arrestor bed may be spread and shaped by any means to obtain the desired cross section shown on the plans. Water shall not be applied to the aggregate. Compaction shall not be used during spreading and shaping operations. Should compaction occur during placement, as determined by the Engineer, the Contractor shall be required to loosen the aggregate to the satisfaction of the Engineer. Loosening the aggregate will be at the Contractor's expense.

The surface of the finished arrestor bed shall not vary more than 25 mm above or below the grade established by the Engineer.

Aggregate for the arrestor bed will be measured and paid for by the cubic meter for arrestor bed aggregate, in the same manner specified for aggregate base in Section 26 of the Standard Specifications.

#### **10-1.27 EROSION CONTROL (BLANKET)**

Erosion control (blanket) shall conform to the details shown on the plans, the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

Erosion control (blanket) work shall consist of applying seed, fiber commercial fertilizer and installing erosion control blanket to embankment slopes, excavation slopes and other areas designated by the Engineer.

**MATERIALS.**—Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and the following:

**SEED.**—Seed for erosion control (blanket) shall conform to the provisions specified for seed under "Erosion Control (Type D)" elsewhere in these special provisions.

**COMMERCIAL FERTILIZER.**—Commercial fertilizer shall conform to the provisions in Section 20-2.02, "Commercial Fertilizer," of the Standard Specifications and shall have a guaranteed chemical analysis of 6-7 percent nitrogen, 1-2 percent phosphoric acid and 3-4 percent water soluble potash. Commercial fertilizer shall be slow release with at least 70 percent organic substance. The commercial fertilizer shall be sterilized and free of weed seeds.

**Compost.**—Compost shall be derived from green material consisting of chipped, shredded or ground vegetation or clean processed recycled wood products or a Class A, exceptional quality biosolids composts, as required by the United States Environmental Protection Agency (EPA), 40 CFR, Part 503c regulations or a combination of green material and biosolids compost. The compost shall be processed or completed to reduce weed seeds, pathogens and deleterious material, and shall not contain paint, petroleum products, herbicides, fungicides or other chemical residues that would be harmful to plant or animal life. Other deleterious material, plastic, glass, metal or rocks shall not exceed 0.1 percent by weight or volume. A minimum internal temperature of 57°C shall be maintained for at least 15 continuous days during the composting process. The compost shall be thoroughly turned a minimum of 5 times during the composting process and shall go through a minimum 90-day curing period after the 15-day thermophilic compost process has been completed. Compost shall be screened through a maximum 6 mm screen. The moisture content of the compost shall not exceed 35 percent. Moisture content shall be determined by California Test 226. Compost products with a higher moisture content may be used provided the weight of the compost is increased to equal the compost with a moisture content of 35 percent. Compost will be tested for maturity and stability with a solvita test kit. The compost shall measure a minimum of 6 on the maturity and stability scale.

**EROSION CONTROL BLANKET.**—Erosion control blanket shall consist of wood excelsior mats secured in place with wire staples and shall conform to the following:

**EXCELSIOR BLANKET.**—Excelsior blanket material shall consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 150 mm or longer. The erosion control blanket shall be of consistent thickness and the wood fiber shall be evenly distributed over the entire area of the blanket. The top surface of the blanket shall be covered with a photo-degradable extruded plastic mesh. The blanket shall be smolder resistant without the use of chemical additives and shall be non-toxic and non-injurious to plant and animal life. Erosion control blanket shall be furnished in rolled strips, 1220 mm  $\pm$  25 mm in width, and shall have an average mass of 0.5-kg/m<sup>2</sup>,  $\pm$  10 percent, at the time of manufacture.

Staples for erosion control blankets shall be made of 11-gage minimum steel wire and shall be U-shaped with 150-mm legs and 25-mm crown or 200-mm legs and a 50-mm crown.

**APPLICATION.**—Erosion control (blanket) materials shall be placed in separate applications as follows:

The first application shall consist of applying seed and commercial fertilizer at the following rates and in the following sequence:

Legume seed shall be applied by a dry method at the rate of 7.0 kg per hectare (slope measurement). Legume seed shall not be applied with hydro-seeding equipment.

Seed, fiber, compost and commercial fertilizer shall be applied at the rates indicated in the following table. If hydro-seeding equipment is used to apply seed, compost and commercial fertilizer, the mixture shall be applied within 60 minutes after the seed has been added to the mixture.

Material	Kilograms per hectare (Slope measurement)
Non-Legume Seed	28.5
Fiber	600
Compost	1800
Commercial fertilizer	1000

The second application shall consist of installing the erosion control blanket over the seed and commercial fertilizer application as follows:

Erosion control blanket strips shall be placed loosely on the slope with the longitudinal joints perpendicular to the slope contour lines. Longitudinal and transverse joints of blankets shall be butted snugly against adjacent strips or overlapped according to the manufacturer's recommendations and stapled. Staples shall be driven perpendicular to the slopes, and shall be located and spaced in accordance with the manufacturer's instructions. Ends of the blankets shall be secured in place according to the manufacturer's instructions.

**MEASUREMENT AND PAYMENT.**—The quantity of erosion control (blanket) to be paid for will be determined by the square meter from actual slope measurement of the area covered by the erosion control blanket.

The contract price paid per square meter for erosion control (blanket) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in erosion control (blanket), complete in place, including furnishing and applying pure live seed, fiber, compost, commercial fertilizer and the materials for the erosion control blanket, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.28 EROSION CONTROL (TYPE D)**

Erosion control (Type D) shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

Erosion control (Type D) work shall consist of applying erosion control materials to embankment and excavation slopes 1:4 (vertical:horizontal) or steeper, and other areas designated by the Engineer. Erosion control (Type D) shall be applied during the period starting September 5 and ending October 10; or, if the slope on which the erosion control is to be placed is finished during the winter season as specified in "Water Pollution Control" elsewhere in these special provisions the erosion control shall be applied immediately; or, if the slope on which the erosion control is to be placed is finished outside both specified periods and the contract work will be completed before September 5, the erosion control shall be applied as a last item of work.

Prior to installing erosion control materials, soil surface preparation shall conform to the provisions in Section 19-2.05, "Slopes," of the Standard Specifications, except that rills and gullies exceeding 50 mm in depth or width shall be leveled. Vegetative growth, temporary erosion control materials and other debris shall be removed from areas to receive erosion control.

**MATERIALS.**—Materials shall conform to Section 20-2, "Materials," of the Standard Specifications and the following:

**SEED.**—Seed shall conform to the provisions in Section 20-2.10, "Seed," of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.

Seed not required to be labeled under the California Food and Agricultural Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts, or a seed technologist certified by the Society of Commercial Seed Technologists.

Seed shall have been tested for purity and germination not more than one year prior to application of seed.

Contract No. «Dist»-«Contract\_No»



Results from testing seed for purity and germination shall be furnished to the Engineer prior to applying seed.

**LEGUME SEED.**—Legume seed shall be pellet-inoculated or industrial-inoculated.

Pellet-inoculated seed shall be inoculated in accordance with the provisions in Section 20-2.10, "Seed," of the Standard Specifications.

Inoculated seed shall have a calcium carbonate coating.

Pellet-inoculated seed shall be sown within 90 days after inoculation.

Industrial-inoculated seed shall be inoculated with Rhizobia and coated using an industrial process by a manufacturer whose principal business is seed coating and seed inoculation.

Industrial-inoculated seed shall be sown within 180 calendar days after inoculation.

Legume seed shall consist of the following:

**LEGUME SEED**

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms pure live seed per hectare (Slope measurement)
Lotus purshianus (Purshings Lotus)	50	2.0
Lupinus bicolor (Pygmy-leafed Lupine)	50	3.0
Lupinus sellulus (Sierra Lupine)	50	2.0

**NON-LEGUME SEED.**—Non-legume seed shall consist of the following:

**NON-LEGUME SEED**

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms pure live seed per hectare (Slope measurement)
*Elymus glaucus 'Stanislaus 5000' (Stanislaus 5000-Blue Wildrye)	55	5
Achillea millefolium (Common Yarrow)	50	0.5
*Elymus elymoides (Bottlebrush Squirreltail)	55	4
*Bromus carinatus (California Brome)	55	6
Vulpia microstachys (Three Weeks Fescue)	50	6
*Festuca idahoensis Bluebunch Grass	50	6
Eriogonum umbellatum (Sulphur Buckwheat)	25	1

\* Seed source shall be from 4000' minimum elevation in the Sierra Mountains north of El Dorado County, California.

Seed shall be delivered to the job site in unopened separate containers with the seed tag attached. Containers without a seed tag will not be accepted.

A sample of approximately 30 g of seed will be taken from each seed container by the Engineer.

**COMMERCIAL FERTILIZER.**—Commercial fertilizer shall conform to the provisions in Section 20-2.02, "Commercial Fertilizer," of the Standard Specifications and shall have a guaranteed chemical analysis of 6-7 percent nitrogen, 1-2 percent phosphoric acid and 3-4 percent water soluble potash. Commercial fertilizer shall be 100 percent natural, slow-release with at least 70 percent organic substance. The commercial fertilizer shall be sterilized and free of weed seeds.

**STRAW.**—Straw shall be derived from dry pine needles.

**STABILIZING EMULSION.**—Stabilizing emulsion shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions.

The requirement of an effective life of at least one year for stabilizing emulsion shall not apply.

Stabilizing emulsion shall be in a dry powder form, may be reemulsifiable, and shall be a processed organic adhesive used as a soil binder.

**COMPOST.**—Compost shall be derived from green material consisting of chipped, shredded or ground vegetation or clean processed recycled wood products, or a Class A, exceptional quality biosolids compost, as required by US EPA, 40 CFR, part 503c regulations, or a combination of green material and biosolids compost. The compost shall be processed or completed to reduce weed seeds, pathogens and deleterious material and shall not contain paint, petroleum products, herbicides, fungicides or other chemical residues that would be harmful to plant or animal life. Other deleterious material such as plastic, glass, metal or rocks shall not exceed 0.1 percent by weight or volume. A minimum internal temperature of 57.2 degrees Celsius shall be maintained for at least 15 continuous days during the composting process. The compost shall be thoroughly turned a minimum of five times during the composting process, and shall go through a minimum 90 days curing period after the 15 day thermophilic compost process has been completed. Compost shall be screened through a minimum 6.3 mm screen.

The moisture content of the compost shall not exceed 35%. Moisture content shall be determined by California Test 226. Compost products with a higher moisture content may be used provided the weight of the compost is increased to equal compost with a maximum moisture content of 35%.

**APPLICATION.**—Erosion control materials shall be applied in 4 separate applications in the following sequence:

Legume seed shall be applied by a dry method at the rate of 7.0 kg/ha (slope measurement). Legume seed shall not be applied with hydro-seeding equipment.

The following mixture in the proportions indicated shall be applied with hydro-seeding equipment within 60 minutes after the seed has been added to the mixture:

Material	Kilograms per hectare (Slope measurement)
Fiber	600
Non-Legume Seed	28.5
Commercial fertilizer	1000
Compost	1800

Straw shall be applied at the rate of 10.0 tonnes per hectare based on slope measurements. Incorporation of straw will not be required.

The following mixture in the proportions indicated shall be applied with hydro-seeding equipment:

Material	Kilograms per hectare (Slope measurement)
Fiber	600
Commercial fertilizer	1000
Stabilizing emulsion	140
Compost	1800

The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer.

Once straw work is started in an area, the remaining applications shall be completed in that area on the same working day.

Full compensation for compost shall be considered as included in the contract price paid per square meter for erosion control (type D) and no separate payment will be made therefor.

#### **10-1.29 EROSION CONTROL (MULCH)**

Erosion control (Mulch) shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

Erosion control (Mulch) work shall consist of applying erosion control materials to embankment and excavation slopes 1:4 (vertical:horizontal) or steeper, and other areas designated by the Engineer. Erosion control (Type D) shall be applied during the period starting September 5 and ending October 10; or, if the slope on which the erosion control is to be placed is finished during the winter season as specified in "Water Pollution Control" elsewhere in these special provisions the erosion control shall be applied immediately; or, if the slope on which the erosion control is to be placed is finished outside both specified periods and the contract work will be completed before September 5, the erosion control shall be applied as a last item of work. Prior to installing erosion control materials, soil surface preparation shall conform to the provisions in Section 19-2.05, "Slopes," of the Standard Specifications, except that rills and gullies exceeding 50 mm in depth or width shall be leveled. Vegetative growth, temporary erosion control materials and other debris shall be removed from areas to receive erosion control.

**COMPOST.**—Compost for erosion control (mulch) shall conform to the provisions specified for compost under "Erosion Control (Type D)" elsewhere in these special provisions

**STABILIZING EMULSION.**--Stabilizing emulsion shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions.

The requirement of an effective life of at least one year for stabilizing emulsion shall not apply.

Stabilizing emulsion shall be in a dry powder form, may be reemulsifiable, and shall be a processed organic adhesive used as a soil binder.

**PINE NEEDLES.**--Mulch shall be dry pine needles. Pine needles may include other forest litter materials such as pine cones, duff and other small woody twigs.

Deleterious materials such as rocks, glass, plastics, metals, clods, weeds, weed seeds, coarse objects, sticks larger than the specified particle size, salts, paint, petroleum products, pesticides or other chemical residues that would be harmful to plant or animal life shall not exceed 0.1 percent of the mulch volume. At least 85 percent of the mulch, by volume, shall conform to the particle size specified.

**APPLICATION.**—Erosion control materials shall be applied in 2 separate applications in the following sequence:

Pine needles shall be applied to a minimum thickness of 125 mm.

The following mixture in the proportions indicated shall be applied with hydro-seeding equipment:

Material	Kilograms per hectare (Slope measurement)
Fiber	450
Compost	1800
Stabilizing Emulsion	150

The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer.

The contract price paid per square meter for erosion control (mulch) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in erosion control (mulch), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### 10-1.30 FIBER ROLLS

Fiber rolls shall conform to the details shown on the plans and to the provisions in these special provisions.

#### MATERIALS

Fiber rolls shall consist of one of the following:

Fiber rolls shall be constructed on the site with manufactured blankets consisting of one or a combination of wood excelsior, rice, wheat or coconut fibers. The blanket shall measure approximately 3.5 meters wide by 26 to 29 meters in length. Wood excelsior material shall have individual fibers, 80 percent of which shall be 150 mm or longer in fiber length. The blanket shall have a photodegradable plastic netting. The blanket shall be rolled on the blanket's width and secured with jute twine spaced 2 meters apart along the roll for the full length and 150 mm from each end of the individual rolls. The blanket shall be rolled so that the netting is on the outside of the finished roll. The finished roll diameter shall be a minimum of 175 mm and a maximum of 225 mm and shall weigh not less than 1.3 kg per meter.

Fiber rolls shall be pre-manufactured rice or wheat straw, wood excelsior or coconut fiber rolls encapsulated within a photodegradable plastic netting. Each roll shall be a minimum of 175 mm and a maximum of 225 mm in diameter and 7 to 9 meters in length and shall weigh not less than 1.3 kg per meter. The netting shall be ultraviolet (UV) degradable plastic. The netting shall have a minimum durability of one year after installation. The netting shall be secured tightly at each end of the individual rolls.

Stakes shall be fir or pine and shall be a minimum of 25 mm x 25 mm x 600 mm in length. Metal stakes may be used as an alternative. The Contractor shall submit a sample of the metal stake to the Engineer prior to installation. The tops of the metal stakes shall be bent over at a 90-degree angle. No additional compensation will be allowed for the use of a metal stake.

### **INSTALLATION**

Fiber rolls shall be joined tightly together to form a single linear roll that is installed approximately parallel to the slope contour. Fiber rolls shall be installed prior to the application of other erosion control materials.

Furrows shall be constructed at a slight angle to the slope contour, to a depth of 50 to 100 mm, and at a sufficient width to hold the fiber rolls. Soil excavated for furrows shall be placed against the fiber roll on uphill side.

Rolls shall be installed 4 meters apart (measured along the slope) in the furrows with the first row installed 1.5 meters above the toe of slope. Individual rolls shall be placed with adjacent ends butted firmly to each other to create a continuous linear roll.

Stakes shall be installed 1.2 meters apart along the total length of the rolls and 125 mm from the end of each individual roll. Stakes shall be driven flush or a maximum of 50 mm above the roll.

### **MEASUREMENT AND PAYMENT**

Fiber rolls will be measured by the meter from end to end along the centerline of the installed rolls.

The contract price paid per meter for fiber rolls shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing fiber rolls, complete in place, including stakes, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **10-1.31 WILLOW CUTTINGS (PLANT GROUP W)**

Willow cutting work shall consist of obtaining, transporting and planting willow cuttings. The work shall conform to the provisions in Section 20-4, "Highway Planting," of the Standard Specifications and these special provisions.

Willow cuttings shall not be planted before October 1 nor after November 15 and not until the soil is moist to a minimum depth of 200 mm, unless otherwise permitted, in writing, by the Engineer. Cuttings shall be planted where directed by the Engineer.

Prior to planting, an area 600 mm in diameter at each proposed plant (willow cutting) location shall be cleared of all weed growth. Pesticides shall not be used for weed control within the 600-mm diameter area.

The Contractor shall notify the Engineer, in writing, 10 working days prior to gathering willow cuttings. The cuttings shall be taken only from the areas shown on the plans or other adjacent areas designated by the Engineer.

Willow cuttings shall be taken at random from healthy, vigorous plants and when the plants are in a dormant condition. Not more than 50 percent of the plants in any designated area shall be cut, nor shall more than 25 percent of each individual plant be cut. Cuts shall be made with sharp, clean tools.

Willow cuttings shall be reasonably straight, 600 mm to 800 mm in length, and 20 mm to 40 mm in diameter at the base of the cutting. The top of each willow cutting shall be cut square above a leaf bud, and the base of each willow cutting shall be cut below a leaf bud at an angle of approximately 45 degrees. Willow cuttings shall have leaves and branches trimmed off flush with the stem. Pruned branches and trimmings shall be spread in the designated willow cutting areas so as not to leave the areas unsightly.

Willow cuttings shall be planted within 48 hours after cutting and shall be kept wet until planted. Willow cuttings not planted within 48 hours after cutting, or allowed to dry out, shall not be used. Willow cuttings not used shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

A root stimulant shall be applied to the willow cuttings immediately prior to planting. The stimulant shall be applied in accordance with the printed instructions of the root stimulant manufacturer. A copy of the instructions shall be furnished to the Engineer prior to applying the stimulant.

Planting holes shall be made perpendicular to the ground line and shall be formed with a steel bar or excavated by use of an auger, post hole digger or similar tools. Plant holes shall be large enough to receive the willow cuttings in order that the willow cuttings may be planted to the proper depths without damage to the bark. Where rock or other hard material prohibits holes from being excavated as specified, new holes shall be excavated and the abandoned holes backfilled.

If the soil in and around the plant hole is not wet prior to planting, the soil shall be watered and maintained in a wet state until the willow cuttings are planted.

Commercial fertilizer (tablet) shall be a slow release type, shall be 21-g size tablets weighing  $21 \pm 1$ -g each, and shall have the following guaranteed chemical analysis:

Ingredient	Percentage
Nitrogen	20
Phosphoric Acid	10
Water Soluble Potash	5

One 21-g size commercial fertilizer tablet shall be placed at the bottom of each planting hole and covered with a minimum of 50 mm of soil before planting the willow cutting.

At the option of the Contractor, two 10.5-g size tablets may be used in lieu of each 21-g size tablet specified herein. Regardless of the tablet size used, each tablet shall be the slow release type and shall have the same guaranteed chemical analysis as specified for the 21-g size tablets. Each 10.5-g size tablet shall weigh  $10.5 \pm 0.5$ -g.

The base of willow cuttings shall be planted from 300 to 400 mm deep (approximately one-half the willow cutting's length) and shall have from 3 to 5 bud scars exposed above the plant hole. After planting, the plant holes shall be backfilled with excavated material. The excavated material shall be distributed evenly within the hole without clods, lumps or air pockets and compacted without damage to the willow cutting's bark. Compaction shall be adequate to prevent the willow cutting from being easily removed from the soil.

Cuttings shall be watered and maintained in a healthy condition from the time the cuttings are planted until acceptance of the contract. Cuttings that die shall be replaced at the Contractor's expense. The method of planting replacement cuttings shall be as specified in this section for willow cuttings.

The quantity of willow cuttings will be measured as units determined from actual count in place, excluding additional willow cuttings required for replacement cuttings.

Full compensation for obtaining and transporting willow cuttings, preparing planting holes, furnishing and placing fertilizer tablets, applying root stimulant, and for watering and maintaining willow cuttings shall be considered as included in the contract unit price paid for plant (Group W) and no additional compensation will be allowed therefor.

#### **10-1.32 AGGREGATE BASE**

Aggregate base shall be Class 2 and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications and these special provisions.

The first paragraph of Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications is amended by adding the following sentences:

Aggregate may include or consist of material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base, glass or a combination of any of these materials. Aggregate base incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate base.

The fourth paragraph in Section 26-1.02A, is amended by adding the following sentence:

Untreated reclaimed asphalt concrete and portland cement concrete will not be considered to be treated with lime, cement or other chemical material for purposes of performing the Durability Index test.

The material for aggregate base shall not be cinder type in nature and the aggregate weight shall be greater than 2167 kilograms per cubic meter.

#### **10-1.33 SLURRY SEAL**

Slurry seal shall conform to the provisions in Section 37-2, "Slurry Seal," of the Standard Specifications and these special provisions.

The aggregate for slurry seal shall be Type III.

Asphaltic emulsion shall be, at the option of the Contractor, either quick-setting Type QS1h or CQS1h asphaltic emulsion and shall conform to the requirements in Section 94, "Asphaltic Emulsions," of the Standard Specifications.

#### **10-1.34 REPLACE ASPHALT CONCRETE SURFACING**

This work shall consist of removing existing asphalt concrete surfacing and underlying base and replacing the removed surfacing and base with new asphalt concrete as shown on the plans and in accordance with these special provisions.

The exact limits of asphalt concrete surfacing to be removed and replaced will be determined by the Engineer.

Existing asphalt concrete surfacing and underlying base material removed during a work period shall be replaced before the time the lane is to be opened to public traffic as designated in "Maintaining Traffic" of these special provisions.

The outline of the asphalt concrete to be removed shall be cut with a power-driven saw to a depth of not less than 46 mm before removing the surfacing. Surfacing and base shall be removed without damage to surfacing that is to remain in place. Damage to pavement which is to remain in place shall be repaired to a condition satisfactory to the Engineer, or the damaged pavement shall be removed and replaced with new asphalt concrete if ordered by the Engineer. Repairing or removing and replacing pavement damaged outside the limits of pavement to be replaced shall be at the Contractor's expense and will not be measured nor paid for.

Removed materials shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The material remaining in place, after removing surfacing and base to the required depth, shall be graded to a plane, watered, and compacted. The finished surface of the remaining material shall not extend above the grade established by the Engineer.

Areas of the base material which are low as a result of over excavation shall be filled, at the Contractor's expense, with asphalt concrete.

Asphalt concrete shall conform to the provisions for asphalt concrete in "Asphalt Concrete" of these special provisions except for payment.

The quantity of replace asphalt concrete surfacing to be paid for will be measured by the cubic meter. The volume to be paid for will be calculated on the basis of the dimensions shown on the plans adjusted by the amount of any change ordered by the Engineer.

The contract price paid per cubic meter for replace asphalt concrete surfacing shall include full compensation for furnishing all labor, materials (including asphalt concrete), tools, equipment, and incidentals, and for doing all the work involved in replacing asphalt concrete surfacing, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

If the aggregates for the asphalt concrete did not meet the "Contract Compliance" requirements for Sand Equivalent or gradation, and if the Contractor requests the material be accepted on the basis of a penalty, as provided in the Section 39-2.02, "Aggregate," of the Standard Specifications and the Engineer approves the request, the penalty shall be \$4.58 per cubic meter.

#### 10-1.35 ASPHALT CONCRETE

Asphalt concrete shall be Type A and shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

Asphalt concrete used to change the cross slope of surfacing shall not be considered to be asphalt concrete (leveling), and shall be constructed as specified for asphalt concrete pavement.

Asphalt concrete used to change the cross slope of surfacing shall not be considered to be asphalt concrete (leveling) for payment purposes and shall be paid for as the type of asphalt concrete specified.

Asphalt concrete dike transition will be measured and paid for as place asphalt concrete dike (Type A).

The grade of asphalt binder to be mixed with aggregate for Type A asphalt concrete shall be PBA Grade 6b and shall conform to the requirements of "Asphalt" elsewhere in these special provisions.

The amount of asphalt binder used in asphalt concrete placed in dikes, gutters, gutter flares, overside drains and aprons at the ends of drainage structures shall be increased one percent by mass of the aggregate over the amount of asphalt binder determined for use in asphalt concrete placed on the traveled way.

The aggregate for Type A asphalt concrete shall conform to the 19 mm maximum, medium grading specified in Section 39-2.02, "Aggregate," of the Standard Specifications.

The aggregate for asphalt concrete shall not be cinder type in nature and the aggregate weight shall be greater than 2167 kilograms per cubic meter.

In addition to aggregate quality requirements specified in Section 39-2.02, "Aggregate," of the Standard Specifications, aggregate from each source shall also conform to the following quality requirements:

Test	California Test	Asphalt Concrete Type A
Los Angeles Rattler	211	
Loss at 500 Rev. (Max)		25%

Fine aggregate shall be obtained from a source or sources that meet the requirements for California Test Method 211 specified for coarse aggregate and shall also conform to the following quality requirement:

Test	California Test	Requirement
Durability Index (Df)	229	50 Min

Asphalt concrete placed in layers of 45 mm or less in compacted thickness or widths of less than 1.5 m shall be spread and compacted with the equipment and by the methods specified in Section 39. All other asphalt concrete shall be compacted and finished in conformance with the provisions of Section 39, amended as follows:

Section 39-5.02, "Compacting Equipment," of the Standard Specifications is amended to read:

**39-5.02 Compacting Equipment.**—The Contractor shall furnish a sufficient number of rollers to obtain the specified compaction and surface finish required by these specifications.

All rollers shall be equipped with pads and water systems which prevent sticking of asphalt mixtures to the pneumatic- or steel-tired wheels. A parting agent, which will not damage the asphalt mixture, as determined by the Engineer, may be used to aid in preventing the sticking of the mixture to the wheels.

The second paragraph of Section 39-6.01, "General Requirements," of the Standard Specifications is amended to read:

Asphalt concrete and asphalt concrete base shall be compacted by any means to obtain the specified relative compaction before the temperature of the mixture drops below 65.0°C. Additional rolling to achieve the specified relative compaction will not be permitted after the temperature of the mixture drops below 65.0°C. or once the pavement is opened to public traffic. When vibratory rollers are used as finish rollers the vibratory unit shall be turned off.

Section 39-6.03, "Compacting," of the Standard Specifications is amended by deleting the fifth, and seventh through tenth paragraphs and adding the following before the eleventh paragraph:

Asphalt concrete and asphalt concrete base shall be compacted to a relative compaction of not less than 96.0 percent and shall be finished to the lines, grades and cross section shown on the plans. In-place density of asphalt concrete and asphalt concrete base will be determined prior to opening the pavement to public traffic.

Relative compaction will be determined by California Test 375.

If the test results for any lot of asphalt concrete or asphalt concrete base indicate that the relative compaction is below 96.0 percent, the Contractor will be advised that the required relative compaction has not been achieved and that the Contractor's materials or procedures, or both, require adjustment. Asphalt concrete or asphalt concrete base spreading operations shall not continue until the Contractor has notified the Engineer of the adjustment that will be made in order to meet the specified relative compaction.

If the test results for any lot of asphalt concrete or asphalt concrete base indicate that the relative compaction is less than 96.0 percent, the asphalt concrete or asphalt concrete base represented by that lot shall be removed, except as otherwise provided below. Asphalt concrete and asphalt concrete base spreading operations shall not continue until the Contractor makes significant adjustments to the materials or procedures or both in order to meet the specified relative compaction. The adjustments shall be as agreed to by the Engineer. However, if requested by the Contractor and approved by the Engineer, asphalt concrete or asphalt concrete base with a relative compaction of 93.0 percent or greater may remain in place and the Contractor shall pay to the State the amount of reduced compensation for the lot with relative compaction less than 96.0 percent and greater than or equal to 93.0 percent. The Department may deduct the amount of reduced compensation from any monies due, or that may become due, the Contractor under the contract. The amount of reduced compensation the Contractor shall pay to the State will be calculated using the total tonnes represented in the lot with relative compaction less than 96.0 percent and greater than or equal to 93.0 percent times the contract price per tonne for the contract item of asphalt concrete or asphalt concrete base involved times the following reduced compensation factors:

Relative Compaction (Percent)	Reduced Compensation Factor	Relative Compaction (Percent)	Reduced Compensation Factor
96.0	0.000	94.4	0.062
95.9	0.002	94.3	0.068
95.8	0.004	94.2	0.075
95.7	0.006	94.1	0.082
95.6	0.009	94.0	0.090
95.5	0.012	93.9	0.098
95.4	0.015	93.8	0.108
95.3	0.018	93.7	0.118
95.2	0.022	93.6	0.129
95.1	0.026	93.5	0.142
95.0	0.030	93.4	0.157
94.9	0.034	93.3	0.175
94.8	0.039	93.2	0.196
94.7	0.044	93.1	0.225
94.6	0.050	93.0	0.300
94.5	0.056		

The miscellaneous areas to be paid for at the contract price per square meter for place asphalt concrete (miscellaneous area) in addition to the prices paid for the materials involved shall be limited to the areas listed on the plans.

Aggregate for asphalt concrete dikes shall conform to the 9.5-mm, maximum grading as specified in Section 39-2.02, "Aggregate," of the Standard Specifications.

If the Contractor selects the batch mixing method, asphalt concrete shall be produced by the automatic batch mixing method as provided in Section 39-3.03A(2), "Automatic Proportioning," of the Standard Specifications.

If the finished surface of the asphalt concrete on the Route 80 traffic lanes does not meet the specified surface tolerances, it shall be brought within tolerance by either (1) abrasive grinding (with fog seal coat on the areas which have been ground), (2) removal and replacement, or (3) placing an overlay of asphalt concrete. The method will be selected by the Engineer. The corrective work shall be at the Contractor's expense.

If abrasive grinding is used to bring the finished surface to specified surface tolerances, additional grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel to the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline, within any ground area. All ground areas shall be neat rectangular areas of uniform surface appearance. Abrasive grinding shall conform to the requirements in the first paragraph and the last 4 paragraphs in Section 42-2.02, "Construction," of the Standard Specifications.

In addition to the aggregate requirements listed in Section 39, "Asphalt Concrete," of the Standard Specifications, the combined aggregates shall conform to the following quality requirement when mixed with Performance Based Asphalt (PBA) Grade 6b in the amount of asphalt determined to be optimum by California Test 367:

Test	Test Designation	Requirement
Surface Abrasion	California Test 360	Loss not to exceed 40 grams
Tensile Strength Ratio	AASHTO Designation T-283	0.70 Min.

At the Contractor's option, a liquid anti-strip additive, approved by the Engineer, may be used in the amount of 0.5 percent by weight of the asphalt binder to conform to the tensile strength ratio requirement. If the Contractor elects to use an anti-strip additive, the State will wave the tensile strength ratio test (AASHTO Designation T-283). Full compensation for furnishing and mixing an anti-strip additive with the aggregate and paving asphalt shall be considered as included in the contract price paid per tonne for asphalt concrete (Type A) and no separate payment will be made therefor.

The Contractor shall furnish samples of aggregate at least four weeks prior to their intended use, in the quantity requested by the Engineer, from the source or sources he proposes to use for the project.

In addition to the requirements in Section 39-5.01, "Spreading Equipment," of the Standard Specifications, asphalt paving equipment shall be equipped with automatic screed controls and a sensing device or devices.



When placing asphalt concrete to the lines and grades established by the Engineer, the automatic controls shall control the longitudinal grade and transverse slope of the screed. Longitudinal grades and transverse slopes for the top lift of the variable depth asphalt concrete sections shall be established with automatic screed controls utilizing wire grade control. Wire grade lines shall be furnished, installed and maintained by the Contractor. Subsequent layers of asphalt concrete shall be placed using a ski device. The minimum length of the ski device shall be 9 m. The ski device shall be a rigid one piece unit and the entire length shall be utilized in activating the sensor.

When using a ski device, the end of the screed nearest the centerline shall be controlled by a sensor activated by the ski device. The end of the screed farthest from centerline shall be controlled by an automatic transverse slope device set to reproduce the cross slope designated by the Engineer.

When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat shall be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 3-mm tolerance. The end of the screed farthest from the previously placed mat shall be controlled in the same manner as when placing the initial mat.

Should the methods and equipment furnished by the Contractor fail to produce a layer of asphalt concrete conforming to the requirements, including straightedge tolerance, of Section 39-6.03, "Compacting," of the Standard Specifications, the paving operations shall be discontinued and the Contractor shall modify the equipment or methods, or furnish substitute equipment.

Should the automatic screed controls fail to operate properly during any day's work, the Contractor may use manual control of the spreading equipment for the remainder of that day, however, the equipment shall be corrected or replaced with alternative automatically controlled equipment conforming to the requirements in this section before starting another day's work.

The area to which paint binder has been applied shall be closed to public traffic. Care shall be taken to avoid tracking binder material onto existing pavement surfaces beyond the limits of construction.

A drop-off of more than 46 mm will not be allowed at any time between adjacent lanes open to public traffic.

Shoulders or median borders adjacent to a lane being paved shall be surfaced prior to opening the lane to traffic.

#### **10-1.36 BOND BREAKER**

This work shall consist of furnishing and placing or applying a bond breaker between the asphalt concrete pavement and the new portland cement concrete pavement, as shown on the plans.

The bond breaker shall be a pigmented curing compound conforming to the requirements in ASTM Designation: C309, Type 2, Class A or B and to the requirements of Section 90, "Portland Cement Concrete" of the Standard Specifications. Curing compound shall be applied at a nominal rate of 3.7 m<sup>2</sup>/L.

Full compensation for furnishing and placing or applying a bond breaker shall be considered as included in the contract price paid per cubic meter for concrete pavement and no separate payment will be made therefor.

#### **10-1.37 CONCRETE PAVEMENT (DOWELED)**

**General.** -- Portland cement concrete pavement shall conform to the provisions in Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications and these special provisions.

**Pre-paving Conference.** -- Supervisory personnel of the contractor and any subcontractor who are to be involved in the concrete paving work shall meet with the Engineer, at a mutually agreed time, to discuss methods of accomplishing all phases of the paving work.

The contractor shall provide the facility for this meeting. Attendance at this pre-paving meeting is mandatory for the following "key" contractor personnel: project superintendent, paving construction foreman, subcontractors, concrete plant operations personnel (including plant supervisors, manager, and operator) and paving operators. All meeting attendees will sign an attendance sheet provided by the Engineer. Production and placement shall not begin nor proceed unless the "key" contractor personnel have attended the mandatory meeting.

The "key" contractor personnel along with the Engineer's representatives shall attend a 4-hour training class on portland cement concrete and paving techniques as part of the pre-paving conference. This training class time will be in addition to the regular meeting time. The class shall be scheduled no more than 2 weeks prior to the placement of portland cement concrete pavement. The class shall be held during normal working hours. The Engineer shall arrange for the instructor of the class.

**Test Strip.** -- At the beginning of paving operations, the contractor shall construct initial test strip of concrete pavement at least 200 meters, but not more than 300 meters in length at the specified paving width. If this test strip meets specifications, then it will become part of the project's paving surface. The Engineer will determine specified paving width. The contractor shall use the same equipment for the remainder of the paving operations. The contractor shall not perform

further paving until the test strip is evaluated according to Section 40-1.10, "Final Finishing," of the Standard Specifications regarding surface straight edged and profile requirements; for dowel and tie bar alignment verification; concrete quality; and pavement thickness. If the test strip of concrete pavement meets specifications, then it shall be part of the paving surface and will be paid for under the appropriate bid item(s). An additional test strip will be required when:

- (1) The contractor proposes using different paving equipment including the batch plant, paver, dowel inserter, tining, or curing equipment.
- (2) Any portion of a test strip fails to meet the standards for "Final finishing" of Section 40-1.10 of the Standard Specifications for straight edge and profile requirements without the use of grinding or other corrective method.
- (3) The dowel tolerances are not met.
- (4) Pavement thickness deficiency is greater than 15mm.
- (5) Change in concrete mix design.

The contractor shall perform coring of the test strips, as directed by the Engineer, as part of the dowel or tie bar placement tolerance verification. A minimum of six dowel bars shall be cored for each test strip. After removal of cores, voids in concrete pavement shall be cleaned and filled with cementitious backfill materials conforming to "Dowel Placement Alignment Assurance (Core Drilling)" elsewhere in these special provisions.

Regardless of the placement method [load transfer assemblies (dowel baskets) or mechanical inserters] chosen by the Contractor, after the initial test strip is placed, the Contractor shall suspend his operations until the Engineer has sufficient time to inspect dowel positioning to insure proper alignment of dowels is being achieved. Dowel alignment tolerance allowance shall be in conformance to the requirements of these specifications.

The contractor shall change methods and/ or equipment and construct additional test strips until a test strip meets the "Final Finishing" requirements of Section 40-1.10 of the Standard Specifications, and dowel bar alignment verification, without grinding or other corrective work. These additional test strips shall be limited to 200 meters in length.

If three test strips fail to meet the finishing requirements as stated above, before grinding, all three strips shall be removed at the contractor's expense and additional test strips shall be constructed, until the requirements of these specifications are met.

The Engineer may waive the initial test strip if the contractor is proposing to use a batch plant mixer and paving equipment with the same key personnel that were satisfactorily used on a Department project within the preceding 12 months and the mixer has not been altered or moved. Key personnel shall be defined as the same individuals as listed in the Pre-paving conference.

Materials resulting from the construction of all rejected test strips shall become property of the Contractor and shall be removed and disposed outside the highway right of way as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

**Concrete.** -- The concrete for pavement shall contain a minimum of 400 kilograms of portland cement per cubic meter and shall conform to the following:

1. No reduction in portland cement content shall be allowed.
2. Mineral admixtures shall not be used, unless otherwise ordered by the Engineer.
3. Aggregates shall not be potentially deleterious or deleterious when tested in accordance with ASTM C289.
4. Aggregates shall not be cinder type in nature.

The contractor shall not use calcium chloride as an admixture. Contractor shall use a non-corrosive, non-chloride, set accelerating admixture conforming to ASTM C 494, Type C and to the requirements in Section 90-4, "Admixtures," of the Standard Specifications. Application rate shall be in accordance with manufacturer's recommendations. The Engineer will determine the exact application rate for set accelerating admixture.

An air-entraining admixture conforming to the requirements in Section 90-4, "Admixtures," of the Standard Specifications shall be added to the concrete at the rate required to result in an air content of 4.5 ( $\pm$ 1.5) percent in the freshly mixed concrete.

In addition to the longitudinal joints required at traffic lane lines, longitudinal joints shall be constructed between portland cement concrete shoulders and adjacent traffic lanes, and tie bars shall be installed at such joints as provided herein. Transverse weakened plane joints across portland cement concrete shoulders shall be continuous with such joints across the traveled way.

**Tie Bars.** -- Tie bars shall be installed at longitudinal contact and weaken plane joints as shown on the plans. In no case, shall any consecutive width of new PCC pavement tied together with tie bars exceed 15 meters. Tie bars shall be deformed reinforcing steel bars conforming to ASTM Designation: A 615/A 615M, Grade 300 or 400, and shall be epoxy coated as

specified in Section 52-1.02B, "Epoxy-coated Bar Reinforcement," of the Standard Specifications, except that references made to ASTM Designation D 3963 shall be changed to ASTM Designation A 934 or A 775. Tie bars shall not be bent. In no case shall tie bars be used at a joint where PCC and asphalt concrete pavements abut.

Tie bars shall be installed at longitudinal joints by one of the following methods:

(1) Drilling and bonding tie bars with epoxy shall conform to the details shown on the Standard Plans.

The epoxy shall be a two-component, epoxy-resin, conforming to the specifications to ASTM Designation: C881, Type V, Grade 3 (Non-Sagging), and Class B. Epoxy shall be accompanied by a Certificate of compliance as provided in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. A copy of the manufacturer's recommended installation procedure shall be provided to the Engineer 7 days prior to the start of work or at the Pre-paving Conference, which ever occurs first.

The drilled holes shall be cleaned in accordance with the epoxy manufacturer's instructions and shall be dry at the time of placing the epoxy and tie bars. Immediately after inserting the tie bars into the epoxy, the tie bars shall be supported as necessary to prevent movement during the curing and shall remain undisturbed until the epoxy has cured a minimum time as specified by the manufacturer.

Tie bars that are improperly bonded, as determined by the Engineer, will be rejected. If rejected, adjacent new holes shall be drilled, as directed by the Engineer, and new tie bars shall be placed and securely bonded to the concrete. All work necessary to correct improperly bonded tie bars shall be performed at the Contractor's expense.

(2) By inserting the tie bars into the plastic slipformed concrete before finishing the concrete. Any loose tie bars, shall be replaced by drilling and grouting into place with epoxy as described in method (1) above, at the contractor's expense.

(3) By using threaded dowel splice couplers fabricated from deformed rebar material, free of external welding or machining. Threaded dowel splice couplers shall be accompanied by a Certificate of Compliance as provided in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, and shall be accompanied with installation instructions. The Certificate of Compliance shall be provided to the Engineer at the Pre-Paving Conference. Installation of threaded dowel splice couplers shall be in accordance with the manufacturer's recommendations.

**Liquid Joint Sealant Installation.**--The joint sealant detail for transverse and longitudinal joints, as shown on the plans, shall apply only to all weakened plane joints. All weakened plane joints shall be constructed by the sawing method. Should grinding or grooving be required over or adjacent to any joint after sealant has been placed, the joint materials shall be completely removed and replaced at the Contractor's expense. All joints shall have a sealant recessed below the final finished surface as shown on the plans.

At the contractor's option, transverse weaken plane joints shall be either Type DSC or SSC as shown on the plans. Longitudinal weakened plane joints shall be Type SSC only as shown on the plans.

Seven days after the concrete pavement placement and not more than 4 hours before placing joint sealant materials, the joint walls shall be cleaned by the dry sand blast method and other means as necessary to completely remove from the joint all objectionable material such as soil, asphalt, curing compound, paint and rust. After cleaning the joint, all traces of sand, dust and loose material shall be removed from and near the joint for a distance along the pavement surfaces of at least 50 mm on either side of the joint by the use of a vacuum device. Surface moisture shall be removed at the joints by means of compressed air or moderate hot compressed air or other means approved by the Engineer. Drying procedures that leave a residue or film on the joint wall shall not be used. Sandblasting equipment shall have a maximum nozzle diameter size of 6±1 mm and a minimum pressure of 0.62 MPa.

Joint sealant shall be placed in the clean, dry, prepared joints as shown on the plans. The joint sealant shall be applied by a mechanical device with a nozzle shaped to fit inside the joint to introduce the sealant from inside the joint. Adequate pressure shall be applied to the sealant to ensure that the sealant material is extruded evenly and that full continuous contact is made with the joint walls. After application of the sealant the surface of the sealant shall be recessed as shown on the plans.

Any failure of the joint material in either adhesion or cohesion of the material will be cause for rejection of the joint. The finished surface of joint sealant shall conform to the dimensions and allowable tolerances shown on the plans. Rejected joint materials or joint material whose finished surface do not conform to the dimensions shown on the plans, as determined by the Engineer, shall be repaired or replaced, at the Contractor's expense, with joint material that conforms to the requirements.

After each joint is sealed, all surplus joint sealer on the pavement surface shall be removed. Traffic shall not be permitted over the sealed joints until the sealant is track free and set sufficiently to prevent embedment of roadway debris into the sealant.

**Asphalt Rubber Joint Sealant.**--Asphalt rubber joint sealant shall conform to the requirements of ASTM Designation: D 3405 as modified herein or to the following:

Asphalt rubber joint sealant shall be a mixture of paving asphalt and ground rubber. Ground rubber shall be vulcanized or a combination of vulcanized and devulcanized materials ground so that 100 percent will pass a 2.36-mm sieve. The mixture shall contain not less than 22 percent ground rubber, by mass. Modifiers may be used to facilitate blending.

The asphalt rubber sealant shall have a Ring and Ball softening point of 57°C minimum, when tested in accordance with AASHTO Designation: T 53.

The asphalt rubber sealant material shall be capable of being melted and applied to cracks and joints at temperatures below 204°C.

Section 4.2 of ASTM Designation: D 3405 is modified to read:

Penetration at 25°C, 150g, 5s, shall not exceed 120.

Section 4.5 of ASTM Designation: D 3405 is modified to read:

Resilience - When tested at 25°C, the recovery shall be a minimum of 50 percent.

Each lot of asphalt rubber joint sealant shipped to the job site, whether as specified herein or conforming to the requirements of ASTM Designation: D 3405, as modified herein, shall be accompanied by a Certificate of Compliance as provided in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, and shall be accompanied with storage and heating instructions and precautionary instructions for use. The Certificate of Compliance shall be provided to the Engineer at the Pre-Paving Conference.

Asphalt rubber joint sealant materials shall be heated and placed in conformance with the manufacturer's written instructions and the details shown on the plans. The manufacturer's instructions shall be provided to the Engineer at the Pre-Paving Conference. Asphalt rubber joint-sealant materials shall not be placed when the pavement surface temperature is below 10°C.

**Dowels.** -- Dowels at transverse joints shall be placed as shown on the plans. Dowel bars shall be smooth round epoxy coated steel conforming to the requirements of ASTM Designation: A 36M and shall conform to the details shown on the plans and the provisions in Section 75-1.02, "Miscellaneous Iron and Steel" of the Standard Specifications, except galvanization will not be required. Dowels shall be epoxy coated and shall conform to the provisions of Section 52-1.02B, "Epoxy Coated Bar Reinforcement," of the Standard Specifications, except that references made to ASTM Designation D 3963 shall be changed to ASTM Designation A 934.

Dowels shall be 460 mm  $\pm$  6mm in length and shall be plain, smooth, round, epoxy-coated bars. Dowels shall be free from burrs or other deformations detrimental to free movement of the bars in the concrete. Dowels shall be a nominal 38 mm in diameter for pavement thicknesses greater than or equal to 215 mm and shall be a nominal 32 mm in diameter for pavement thicknesses less than 215 mm.

The contractor may place dowels with either load transfer assemblies (dowel baskets) or by mechanical insertion. Dowels shall be oriented parallel to the pavement lane centerline and surface of the pavement at mid slab depth. Dowel alignment shall be + 6 mm per 300 mm of dowel length in both horizontal and vertical planes.

Dowels shall be lubricated with a bond breaker over the entire bar. A bond breaker application of petroleum paraffin based lubricant or white pigmented curing compound shall be used to coat the dowels completely prior to concrete placement. Oil or asphalt based bond breakers shall not be allowed. Paraffin based lubricant shall be (1) Dayton Superior DSC BB-Coat, or (2) Valvoline Tectyl 506 or an approved equal. Paraffin based lubricant shall be factory applied. White pigmented curing compound shall be in accordance to ASTM Designation: C309, Type 2, Class A, and shall contain 22 percent minimum nonvolatile vehicles consisting of at least 50 percent paraffin wax. Curing compound shall be applied in two separate applications. Each application of curing compound shall be applied at the approximate rate of one liter per 3.7 m<sup>2</sup>.

When load transfer assemblies (dowel baskets) are used, they shall be securely anchored firmly to the base to hold all the dowel bars at the specified depth and alignment during concrete placement without displacement. Spacer wires connecting load transfer assemblies shall be cut or removed after the assemblies are anchored into position prior to concrete placement.

Load transfer assemblies (dowel baskets) shall be either epoxy coated in accordance with ASTM Designation A 884 or shall be fabricated of commercial quality nonmetallic, non-organic material.

If load transfer assemblies are to be used, the contractor shall submit working drawings for review by the Engineer, 14 working days prior to installation or at the Pre-Paving Conference, in conformance to Section 5-1.02 "Plans and Working Drawing" of the Standard Specifications.

Approval of the initial placement of load transfer assemblies shall not constitute acceptance of the final position of the dowel bars.

**Dowel Placement Alignment Assurance (Core Drilling).**-- Coring shall be provided by the Contractor throughout the project to confirm dowel placement as directed by the Engineer. Immediately after coring, the concrete cores shall be identified by the Contractor with a location description and submitted to the Engineer for inspection. The holes shall be cored by methods that will not shatter or damage the concrete adjacent to the holes.

After removal of cores, core hole voids in concrete pavement shall be cleaned and filled with cementitious backfill materials conforming to Section 90, "Portland Cement Concrete," of the Standard Specifications and to the following mix portions:

Cement -	Type III, 42.6 kg
Fine Aggregate -	56.7 kg
Coarse Aggregate -	99.9 kg (0.95cm, top size)
Water	18.9 liters
Non-Chloride Accelerating Admixture**	0.68 kg
Expansion Agent*	127.6 g

- \*Expansion Agent – One part aluminum powder to 50 parts filler of inert flyash or pumicite.
- \*\*Non-Chloride Accelerating Admixture – ASTM Designation: C494, Type C.

After placement of cementitious backfill material, the material while still plastic shall be trowelled smooth to match the pavement surface. The backfill material shall not evidence any depressions or surplus material above the level surface of the pavement.

Water for core drilling operations shall be from a local domestic water supply. Water used for coring shall not contain more than 1000 parts per million of chlorides as Cl, nor more than 1300 parts per million of sulfates as SO<sub>4</sub>, nor shall it contain any impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

Water from core drilling operations shall not be permitted to fall on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into gutters or other drainage facilities.

The Engineer will randomly check dowel positioning by coring or other methods. Each day's paving will be checked by the Engineer within two calendar days by performing one test for every 1670 square meters of doweled pavement or fraction thereof. One test shall consist of drilling two cores, one on each end of a dowel bar to expose both ends and allow measurement for proper alignment. If the dowel bars are located incorrectly or air voids exist surrounding the dowel bars, additional cores will be required to determine the severity. The Engineer shall select the location for performing the test.

Dowel alignment shall meet the specified tolerances. If at any time dowels are found to be installed improperly, the paving operations will be suspended and operations shall not begin until the Contractor has demonstrated to the Engineer that the problem which cause the improper dowel positioning has been corrected.

Joints containing dowels that do not meet specifications will be rejected. The Contractor shall replace rejected joints by removing concrete a minimum of  $\frac{1}{2}$  the slab length either side of the joint by saw cutting. Concrete removal shall be by the lift out method (non-impact method). New dowel holes shall be drilled by the use of an automatic dowel-digging rig for the dowels to be installed at the contact joint. Dowels shall be placed at the locations as shown on the plans for two new contact joints. No additional payment will be made for replacement of slabs and joints required due to joints (dowel placement) not meeting the specified tolerances.

**Transverse Contact (Construction) Joints.** -- A transverse (contact) construction joint shall be constructed at the end of each day's work or where concrete placement is interrupted for more than 30 minutes, to coincide with the next weakened plane joint location.

If sufficient concrete has not been mixed to form a slab to match the next weakened plane joint, when an interruption occurs, the excess concrete shall be removed and disposed back to the last preceding joint. The cost of removing and disposing of any excess concrete shall be at the contractor's expense. Any excess material shall become the property of the contractor and shall be properly disposed of.

A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of dowel bars.

**Measurement and Payment.** -- Sealing longitudinal and transverse weakened plane joints in portland cement concrete pavement will be measured by the meter.

The contract price paid per meter for seal pavement joint shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in sealing pavement joints complete in place, including sawing, cleaning, and preparing the joints in the concrete pavement, furnishing and installing repairing and

patching spalled or raveled sawed joints, and replacing or repairing rejected joints, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for furnishing and placing epoxy-coated tie bars and lubricated epoxy coated dowels in portland cement concrete pavement shall be considered as included in the contract price paid per cubic meter for concrete pavement and no separate payment will be made therefor.

Full compensation for drilling holes and bonding tie bars with epoxy resin shall be considered as included in the contract price per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

Full compensation for constructing test strips and coring the test strip shall be considered as included in the contract price per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

Full compensation for providing the facility, key contractor personnel (except for the state provided instructors), and for all work involved in arranging for the pre-paving conference shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

Full compensation for core drilling shall be included in the contract price per cubic meter for concrete pavement and no additional compensation will be allowed therefor. Core drilling shall include furnishing all labor, materials, tools, equipment, and incidentals and for doing all work involved in coring the holes, including the control and disposal of water from core drilling and backfilling core holes with cementitious material.

If the Engineer orders more dowel coring than the 1670 square meter of doweled pavement, these additional cores will be paid as extra work as provided in Section 4-1.03D of the Standard Specifications provided that the core shows that the dowel is within alignment tolerances. Cores that show the dowels are out of alignment shall not be paid as extra work, the drilling for these cores shall be included in the contract price per cubic meter for concrete pavement and no additional compensation will be allowed.

#### **10-1.38 INTERMEDIATE PAVEMENT ANCHORS**

Intermediate pavement anchors shall be constructed as shown on the plans and shall conform to the provisions in Sections 40, "Portland Cement Concrete Pavement," 51, "Concrete Structures," and 52, "Reinforcement," of the Standard Specifications and these special provisions.

Class 1 permeable material and plastic slotted pipe underdrain shall conform to the provisions in Section 68-3, "Edge Drains," of the Standard Specifications and these special provisions.

Reinforcing bars, at the option of the Contractor, may be placed during construction of the pavement anchors or placed prior to constructing the concrete pavement by drilling and bonding the reinforcing bars. Drilling and bonding shall conform to the provisions in Section 83-2.02D(1), "General," of the Standard Specifications.

Intermediate pavement anchors will be measured as units as determined from actual count in place.

The contract unit price paid for intermediate pavement anchor shall include full compensation for furnishing all labor, materials (including portland cement concrete, reinforcing steel, permeable material, and plastic underdrain pipe), tools, equipment and incidentals, and for doing all the work (including excavation and disposal of excavated material) involved in constructing the intermediate pavement anchor, complete in place as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.39 REPLACE CONCRETE PAVEMENT**

Replace concrete pavement shall consist of removing existing portland cement concrete pavement and underlying cement treated base and replacing the removed pavement and base with new portland cement concrete pavement as shown on the plans and in accordance with these special provisions.

**GENERAL.**--The exact limits of concrete pavement removal and replacement will be determined by the Engineer.

Existing concrete pavement and underlying base material removed during a work period shall be replaced, in that same work period, with concrete pavement which shall be cured for at least 6 hours prior to the time the lane is to be opened to public traffic as designated in "Maintaining Traffic" of these special provisions. In the event the existing pavement and base are removed and the Contractor is unable, as determined by the Engineer, to construct, finish and cure the new concrete pavement by the time the replacement pavement is to be opened to traffic, the excavation shall be filled and compacted with a temporary roadway structural section as specified in this section "Replace Concrete Pavement."

The outlines of excavations in the shoulder pavement, except where a joint exists, shall be cut on a neat line to a minimum depth of 75 mm with a power-driven concrete saw or wheel-type rock cutting excavator before any shoulder material is removed. Such excavations shall be permanently or temporarily backfilled to conform to the grade of adjacent pavement prior to opening the replacement pavement to public traffic. Surplus excavated material may be used as temporary backfill material.

The outline of concrete to be removed shall be sawed full depth with a power-driven saw except where the concrete is adjacent to an asphalt concrete shoulder.

**REMOVING EXISTING PAVEMENT AND BASE.**--Regardless of the type of equipment used to remove concrete within the sawed outline, the surface of the concrete to be removed shall not be impacted within 0.5-m of the pavement to remain in place. Pavement and base removal shall be performed without damage to pavement that is to remain in place. Damage to pavement which is to remain in place shall be repaired to a condition satisfactory to the Engineer, or the damaged pavement shall be removed and replaced with new concrete pavement if ordered by the Engineer. Repairing or removing and replacing damaged pavement outside the limits of concrete pavement replacement shall be at the Contractor's expense and will not be measured nor paid for.

Removed materials shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

The material remaining in place, after removing pavement and base to the required depth, shall be graded to a uniform plane, watered, and compacted. The finished surface of the remaining material shall not extend above the grade established by the Engineer.

Areas of the base material which are low as a result of over excavation shall be filled, at the Contractor's expense, with pavement concrete at the time and in the same operation that the replacement concrete is placed.

**PORTLAND CEMENT CONCRETE REPLACEMENT PAVEMENT.**--Portland cement concrete replacement pavement shall conform to the provisions for concrete pavement in Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications and these special provisions.

The provisions in Section 40-1.015, "Cement Content," of the Standard Specifications shall not apply.

The concrete for replacement pavement shall contain not less than 400 kg of portland cement per cubic meter. Portland cement shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements for Type II Modified cement, except the mortar, containing the portland cement to be used and Ottawa sand, when tested in accordance with California Test 527, shall not contract in air more than 0.053-percent.

Calcium chloride conforming to the requirements in Section 90-4, "Admixtures," of the Standard Specifications shall be added to the concrete mix at a rate not to exceed 2 percent of the dry mass of the cement. The exact rate will be determined by the Engineer.

Chemical admixtures and mineral admixtures shall not be used to replace portland cement.

Prior to placing concrete, a 6-mm thick commercial quality polyethylene flexible foam expansion joint filler shall be placed across the original transverse joint faces and extend the full depth of the excavation with the top of the joint filler flush with the top of pavement. The joint filler shall be secured to the face of the existing pavement joint face by any method that will hold the joint filler in place during placement of concrete.

The penetration of concrete mixes for slab replacement shall conform to the requirements in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications, except that the nominal penetration shall not exceed 35 mm and the maximum penetration shall not exceed 65 mm.

Concrete shall not be placed when the atmospheric temperature is 4°C or lower. Concrete shall not be placed when the atmospheric temperature is between 4°C and 10°C unless a written outline of proposed methods for protecting the concrete from rapid cooling has been submitted by the Contractor and approved by the Engineer. Concrete placed when the atmospheric temperature is between 4°C and 15°C shall contain Type II Prestress or Type III portland cement. Concrete placed when the atmospheric temperature is 15°C or higher shall contain Type II Modified, Type II Prestress, or Type III portland cement.

Concrete shall be spread, compacted, and shaped using stationary side forms in accordance with the requirements in Sections 40-1.07, "Spreading, Compacting and Shaping," and 40-1.07A, "Stationary Side Form Construction," of the Standard Specifications, except as follows:

The third paragraph in Section 40-1.07 shall not apply.

Wood side forms not less than 38 mm thick may be used. Wood side forms shall conform to the provisions in Section 51-1.05, "Forms," of the Standard Specifications.

The concrete may be spread, shaped and compacted in accordance with the last paragraph of Section 40-1.07A.

The elevation of the completed pavement surface shall be such that water will not pond on either side of the longitudinal contact joint with the existing parallel concrete pavement.

The new pavement surface at the longitudinal contact joint with the existing parallel concrete pavement shall conform as closely as possible to the elevation of the existing concrete pavement. Any difference in elevation between the new pavement and the existing pavement shall be eliminated by finishing the new pavement within 0.3-m of the existing pavement by hand methods, adding or removing concrete as necessary.

The joint detail shown on the plans for transverse and longitudinal joints, shall not apply.

Transverse weakened plane joints shall be constructed to match the spacing and skew of existing transverse weakened plane joints in the adjacent concrete pavement. If transverse weakened plane joints are to be sawed, the exact time of sawing shall be the Contractor's responsibility, but in any event, the joints shall be sawed prior to opening the pavement to traffic.

The requirements in Section 40-1.08B(3), "Repair of Spalls, Ravelling and Tearing," of the Standard Specifications shall not apply.

Tests to determine the coefficient of friction of the final textured surface will be made only if the Engineer determines by visual inspection that the final texturing may not have produced a surface having the specified coefficient of friction. Any tests to determine the coefficient of friction will be made after the pavement is opened to public traffic, but not later than 5 days after concrete placement. Grooving of pavement areas having a coefficient of friction of less than 0.30, as determined by such tests, shall be performed prior to the installation of any required edge drains adjacent to the areas to be grooved.

Transverse and longitudinal straightedge requirements shall not apply to the pavement surface within 0.3-m of longitudinal contact joints with existing concrete pavement. Longitudinal straightedge requirements shall apply at transverse contact joints with existing concrete pavement and when the straightedge is placed with the midpoint coincident with the joints.

The surface of the concrete pavement will not be profiled and the Profile Index requirements shall not apply.

Concrete replacement pavement shall be cured by the curing compound method. The curing compound shall be curing compound (1) as specified in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. The curing compound shall be applied at the nominal rate of 0.25-L/m<sup>2</sup>. The minimum curing period as specified elsewhere in this section "Replace Concrete Pavement" shall be considered as starting when the curing compound has been applied to the entire slab or slabs of pavement being replaced. Fogging of the pavement surface with water after the curing compound has been applied will not be required. Any damage to the curing compound after the pavement is opened to public traffic shall not be repaired. Should the film of curing compound be damaged from any cause before the pavement is opened to public traffic, the damaged portion shall be repaired immediately with additional compound, at the Contractor's expense.

**TEMPORARY ROADWAY STRUCTURAL SECTION.**--The Contractor shall provide, at the job site, a sufficient standby quantity, as determined by the Engineer, of asphalt concrete and aggregate base for construction of a temporary roadway structural section where existing pavement is being replaced. The temporary structural section shall be maintained, and later removed as a first order of work when the Contractor is able to construct and cure the new concrete pavement replacement within the prescribed time limit. The temporary structural section shall consist of 90-mm thick asphalt concrete over aggregate base.

The aggregate base for the temporary structural section shall be produced from commercial quality aggregates consisting of broken stone, crushed gravel or natural rough-surfaced gravel, and sand, or any combination thereof. The grading of the aggregate base shall conform to the 19-mm maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

The asphalt concrete for the temporary structural section shall be produced from commercial quality aggregates and asphalt binder. The grading of the aggregate shall conform to the 19-mm maximum medium grading in Section 39-2.02, "Aggregate," of the Standard Specifications and the asphalt binder shall conform to the requirements of liquid asphalt SC-800 in Section 93, "Liquid Asphalts," of the Standard Specifications. The amount of asphalt binder to be mixed with the aggregate shall be approximately 0.3-percent less than the optimum bitumen content as determined by California Test 367.

Aggregate base and asphalt concrete for the temporary structural section shall be spread and compacted by methods that will produce a well-compacted, uniform base, free from pockets of coarse or fine material and a surface of uniform smoothness, texture, and density. The aggregate base may be spread and compacted in one layer and the asphalt concrete may be spread and compacted in one layer. The finished surface of the asphalt concrete shall not vary more than 15 mm from the lower edge of a straightedge, 3.6 m  $\pm$  0.06-m long, placed parallel with the centerline and shall match the elevation of the existing concrete pavement along the joint between the existing pavement and temporary surfacing.

The material from the removed temporary structural section shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications except that removed aggregate base may be stockpiled at the job site and reused for construction of another temporary structural section. When no longer required, standby material or stockpiled material for construction of temporary structural sections shall be removed and disposed of outside the right of way in accordance with Section 7-1.13.

**MEASUREMENT AND PAYMENT.**--Replace concrete pavement will be measured and paid for in the same manner specified for concrete pavement in Sections 40-1.13, "Measurement," and 40-1.14, "Payment," of the Standard Specifications, except that the provisions in Section 40-1.135, "Pavement Thickness," of the Standard Specifications shall not apply.

Full compensation for removing and disposing of existing concrete pavement and cement treated base; furnishing and disposing of standby materials for construction of a temporary structural section; and constructing, maintaining, removing and disposing of temporary structural sections shall be considered as included in the contract price paid per cubic meter for replace concrete pavement, and no separate payment will be made therefor.



#### 10-1.40 CRACK EXISTING CONCRETE PAVEMENT

Existing concrete pavement at the locations shown on the plans as areas to be cracked shall be cracked to form discrete segments of pavement as specified in these special provisions.

The Contractor's attention is directed to Section 7-1.09, "Public Safety", of the Standard Specifications. Positive provision shall be provided to contain any flying debris during cracking operations.

Existing concrete pavement shall be cracked into segments nominally measuring 1.8 m transversely by 1.2 m longitudinally. In the event existing panels are already cracked into segments, these segments shall be cracked further into nominally equal-sized square or rectangular pieces having a transverse dimension of not more than 1.8 m and a longitudinal dimension of from 0.9- to 1.5 m, wherever feasible. The pavement cracking tool shall not impact the pavement within 0.3-m of another break line, pavement joint, or edge of pavement.

Concrete pavement shall be cracked such that vertical cracks are formed completely through the pavement. The vertical cracks shall not deviate from vertical by more than 150 mm between the surface of the pavement to the bottom. The cracks shall be continuous without extensive surface spalling along the crack and without excessive shattering of the pavement or base. Spalling over 30 mm in depth will be considered as extensive surface spalling.

Equipment for cracking concrete pavement shall be capable of impacting the pavement with a variable force which can be controlled in force and point of impact. Equipment and procedures that utilize unguided free-falling weights such as "headache balls" shall not be used.

Prior to starting cracking operations the Engineer will select and mark as a test section not less than 3 nor more than 5 existing slabs within the limits of pavement to be cracked. The Contractor shall demonstrate, to the satisfaction of the Engineer, the ability of the selected equipment and procedure to produce cracks in the concrete pavement as specified in these special provisions. Immediately prior to cracking the test section slabs, water shall be applied to the surface of the slabs in sufficient quantity that cracking can readily be determined. After the application of water the Contractor shall crack the test section pavement with the equipment proposed for use on the project using varying impact energy and striking patterns until a proper procedure is established. To verify that the procedure is producing cracked pavement as specified in these special provisions, the Contractor shall take at least two core drilled pavement cores, 150 mm or more in diameter, in the cracked pavement test section. The exact location where cores are to be taken will be designated by the Engineer. Cores shall be obtained in accordance with the provisions of ASTM Designation: C 42. Core holes in the existing pavement shall be filled with a concrete mix containing a fast setting premixed magnesium phosphate cement or a fast setting premixed modified high alumina cement approved by the Engineer.

Once the equipment and the procedure for cracking pavement have been approved as satisfactory by the Engineer, that equipment and procedure shall be utilized to crack the concrete pavement for the project. Cores of the cracked concrete pavement shall be taken by the Contractor in the same manner specified for coring test sections, at intervals of not less than one core per lane kilometer for each machine used to crack the lane. In the event that cores indicate that cracking is unsatisfactory, as determined by the Engineer, or the equipment or procedures are changed, an additional test section will be selected and marked by the Engineer. The Contractor shall crack the additional test sections until the equipment and procedure produce cracked pavement conforming to these special provisions.

Prior to opening cracked concrete pavement to public traffic, the pavement shall be swept and all loose debris removed from the pavement.

Neither the newly cracked pavement nor the first layer of the asphalt concrete shall be exposed to public traffic for more than 15 days.

Cracked pavement segments shall be seated not more than 24 hours prior to receiving the asphalt concrete overlay.

Cracked concrete shall be seated by making not less than 5 passes over the cracked concrete with either an oscillating pneumatic-tired roller conforming to the requirements of the fourth paragraph in Section 39-5.02, "Compacting Equipment," of the Standard Specifications, weighing not less than 13.6 tonnes or a vibratory sheepsfoot roller exerting a dynamic centrifugal force of at least 89 kN. A pass shall be one movement of a roller in either direction. Roller speed shall not exceed 8 km/h.

After all segments have been seated to the satisfaction of the Engineer, loose debris shall be cleaned from all joints and cracks by suitable compressed-air equipment.

Prior to opening the cracked pavement to public traffic and prior to applying asphaltic emulsion paint binder (tack coat) for the first layer of asphalt concrete, the Contractor shall repair joints, cracks, and spalls which are greater than 18 mm in width and greater than 25 mm in depth by applying paint binder (tack coat), filling with asphalt concrete and compacting, as directed by the Engineer. Asphalt concrete shall conform to the specifications for Type B asphalt concrete, 4.75-mm, maximum grading in Section 39, "Asphalt Concrete," of the Standard Specifications.

Crack existing concrete pavement will be measured by the square meter determined from the full width and length of the pavement cracked. No deduction will be made for existing cracked segments.

The contract price paid per square meter for crack existing concrete pavement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work in cracking existing pavement,

testing, seating cracked pavement, cleaning the pavement, filling joints, cracks and spalls, including coring cracked pavement and filling core holes, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.41 CONCRETE STRUCTURES**

Portland cement concrete structures shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Full compensation for corrugated steel pipe riser, galvanized hardware cloth, and sacked pervious backfill material shall be considered as included in the contract price paid per cubic meter for minor concrete (minor structure) and no separate payment will be made therefor.

**General.**— Portland cement concrete shall conform to the provisions in "Freeze-Thaw Requirements," of these special provisions.

Shotcrete shall not be used as an alternative construction method for reinforced concrete members unless otherwise specified.

The first sentence of the tenth paragraph in Section 51-1.05, "Forms," of the Standard Specifications is amended to read:

Form panels for exposed surfaces shall be plywood conforming to or exceeding the requirements of U.S. Product Standard PS 1 for Exterior B-B (Concrete Form) Class I Plywood or any material which will produce a smooth uniform concrete surface substantially equal to that which would result from the use of that plywood.

The third paragraph in Section 51-1.15, "Drains in Walls," of the Standard Specifications is amended to read:

In addition to the drain holes and weep holes specified in the preceding paragraph, holes approximately 75 mm in diameter for relief of hydrostatic pressure shall be provided at the bottom of walls, immediately above the footing, at approximately 4500-mm centers.

#### **10-1.42 STRUCTURE APPROACH SLABS (TYPE R)**

Structure approach slabs (Type R) shall consist of removing portions of existing structures, existing pavement and base including reinforced concrete approach slabs, asphalt concrete surfacing, portland cement concrete pavement, subsealing material and cement treated base and constructing new reinforced concrete approach slabs at structure approaches as shown on the plans and in conformance with these special provisions.

##### **GENERAL**

The thickness shown on the plans for structure approach slabs is the minimum thickness. The thickness will vary depending on the thickness of the pavement and base materials removed.

Where pavement subsealing has been performed under existing approach slabs, the subsealing material shall be removed for its full depth. Where removal of cement treated base is required to construct the approach slab, the entire thickness of cement treated base shall be removed.

Voids between the new reinforced structure approach slab and the base material remaining in place that are caused by removal of subsealing material or cement treated base shall be filled, at the option of the Contractor, with aggregate base (approach slab) or structure approach slab concrete.

The Contractor shall establish a grade line for new approach slabs by setting stringlines on each side of the proposed approach slab. The stringlines shall start approximately 30 m from the structure and extend approximately 15 m onto the structure. The stringlines shall then be adjusted as necessary to provide a smooth profile grade for the new approach slab. The profile grade will be subject to the approval of the Engineer.

The Contractor shall schedule his operations so that the pavement and base materials removed during a work period shall be replaced, in that same work period, with approach slab concrete that shall be cured for at least 6 hours prior to the time the lane is to be opened to public traffic as designated in "Maintaining Traffic" of these special provisions. In the event the existing pavement and base materials are removed and the Contractor is unable, as determined by the Engineer, to construct, finish and cure the new approach slab by the time the lane is to be opened to public traffic, the excavation shall be filled with a temporary roadway structural section as specified in this section, "Structure Approach Slabs (Type R)."

##### **TEMPORARY ROADWAY STRUCTURAL SECTION**

The Contractor shall provide, at the job site, a sufficient standby quantity, as determined by the Engineer, of asphalt concrete and aggregate base for construction of a temporary roadway structural section where existing approaches to structures are being replaced. The temporary structural section shall be maintained, and later removed as a first order of work

when the Contractor is able to construct and cure the approach slab within the prescribed time limit. The temporary structural section shall consist of 90-mm thick layer of asphalt concrete over aggregate base.

The aggregate base for the temporary structural section shall conform to the requirements specified under "Aggregate Base (Approach Slab)" in these special provisions.

The asphalt concrete for the temporary structural section shall be produced from commercial quality aggregates and asphalt binder. The grading of the aggregate shall conform to the 19-mm maximum medium grading in Section 39-2.02, "Aggregate," of the Standard Specifications and the asphalt binder shall conform to the requirements of liquid asphalt SC-800 in Section 93, "Liquid Asphalts," of the Standard Specifications. The amount of asphalt binder to be mixed with the aggregate shall be approximately 0.3-percent less than the optimum bitumen content as determined by California Test 367.

Aggregate base and asphalt concrete for the temporary structural section shall be spread and compacted by methods that will produce a well-compacted, uniform base, free from pockets of coarse or fine material and a surfacing of uniform smoothness, texture, and density. The aggregate base may be spread and compacted in one layer and the asphalt concrete may be spread and compacted in one layer. The finished surface of the asphalt concrete shall not vary more than 15 mm from the lower edge of a 3.6-m straightedge placed parallel with the centerline and shall match the elevation of the existing concrete pavement and structure along the joints between the existing pavement and structure and the temporary surfacing.

The material from the removed temporary structural section shall be disposed of outside the highway right of way in conformance with Section 7-1.13 of the Standard Specifications except that removed aggregate base may be stockpiled at the job site and reused for construction of another temporary structural section. When no longer required, standby material or stockpiled material for construction of temporary structural sections shall be removed and disposed of outside the right of way in conformance with said Section 7-1.13.

### **REMOVING PORTIONS OF EXISTING STRUCTURES**

Attention is directed to "Existing Highway Facilities" of these special provisions.

### **REMOVING EXISTING PAVEMENT AND BASE MATERIALS**

The outline of portland cement concrete to be removed shall be sawed full depth with a power-driven concrete saw.

The outlines of excavations in asphalt concrete shall be cut on a neat line to a minimum depth of 75 mm with a power-driven concrete saw or wheel-type rock cutting excavator before any asphalt concrete material is removed. These excavations shall be permanently or temporarily backfilled to conform to the grade of adjacent pavement prior to opening the lane to public traffic. Surplus excavated material may be used as temporary backfill material.

Regardless of the type of equipment used to remove concrete within the sawed outline, the surface of the concrete to be removed shall not be impacted within 0.5-m of the pavement to remain in place. Removing existing pavement and base materials shall be performed without damage to the adjacent structure or pavement that is to remain in place. Damage to the structure or to pavement that is to remain in place shall be repaired to a condition satisfactory to the Engineer. Damaged pavement shall be removed and replaced with new concrete pavement if ordered by the Engineer. Repairing damage to structures or repairing or removing and replacing damaged pavement outside the limits of structure approach slabs shall be at the Contractor's expense.

Materials removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

The base material remaining in-place, after removing the existing pavement and base materials to the required depth, shall be graded uniformly, watered, and compacted. The finished surface of the base material at any point shall not extend above the grade approved by the Engineer.

Areas of the base material that are low as a result of over excavation by the Contractor shall be filled, at the Contractor's expense, with structure approach slab concrete at the time and in the same operation that the new concrete is placed.

### **AGGREGATE BASE (APPROACH SLAB)**

The aggregate base (approach slab) for filling voids below the reinforced structure approach slab concrete shall be produced from commercial quality aggregates consisting of broken stone, crushed gravel or natural rough-surfaced gravel, and sand, or any combination thereof. The grading of the aggregate base shall conform to the 19-mm maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

Aggregate base (approach slab) for filling voids below the reinforced structure approach slab concrete shall be spread and compacted by methods that will produce a well-compacted, uniform base, free from pockets of coarse or fine material. The aggregate base shall be watered and compacted to the grade approved by the Engineer. Where the required thickness of aggregate base is 200 mm or less, the base may be spread and compacted in one layer. Where the required thickness of aggregate base is more than 200 mm, the base shall be spread and compacted in 2 or more layers of approximately equal thickness, and the maximum compacted thickness of any one layer shall not exceed 200 mm. The finished surface of the base material at any point shall not extend above the grade approved by the Engineer. Areas of the base material that are lower than the grade approved by the Engineer, shall be filled with structure approach slab concrete at the time and in the same operation that the new concrete is placed.

## STRUCTURE APPROACH SLAB

Reinforced concrete approach slabs shall conform to the provisions for approach slabs in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Concrete for use in approach slabs shall contain not less than 400 kg of cement per cubic meter and shall be air-entrained in conformance with the provisions in "Materials" of these special provisions.

Miscellaneous steel parts and all steel components of abutment ties including plates, nuts, washers, and rods shall conform to the provisions in Section 75-1.03, "Miscellaneous Metal," of the Standard Specifications, except that galvanizing will not be required. Miscellaneous steel parts and all steel components of abutment ties including plates, nuts, washers, and rods shall be epoxy-coated and shall conform to the requirements specified elsewhere in these special provisions.

Bar reinforcement shall be epoxy-coated and shall conform to the requirements specified elsewhere in these special provisions.

Approach slab concrete that requires a minimum curing period of 6 hours shall be constructed using a non-chloride Type C chemical admixture. Mineral admixture will not be required in this concrete.

Portland cement for use in concrete using a non-chloride Type C chemical admixture shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements of Type II Modified cement, except the mortar containing the portland cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not contract in air more than 0.053-percent.

The non-chloride Type C chemical admixture shall be approved by the Engineer and conform to the requirements of ASTM Designation: C 494 and Section 90-4, "Admixtures," of the Standard Specifications.

The concrete with non-chloride Type C chemical admixture shall be prequalified prior to placement in conformance with the provisions for prequalification of concrete specified by compressive strength in Section 90-9.01, "General," of the Standard Specifications and the following:

Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of  $21 \pm 1.5^{\circ}\text{C}$  until the cylinders are tested.

The 6-hour average strength of the 5 test cylinders shall not be less than 5.85 MPa. No more than 2 test cylinders shall have a strength of less than 5.5 MPa.

Building paper shall be commercial quality No. 30 asphalt felt.

Polyvinyl chloride (PVC) conduit used to encase the abutment tie rod shall be of commercial quality.

Bar reinforcement or abutment tie rods in drilled holes shall be bonded in conformance with the provisions for drilling and bonding dowels in Section 83-2.02D(1), "General," of the Standard Specifications.

The top surface of approach slabs shall be finished in conformance with the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. The finished top surface shall not vary more than 6 mm from the lower edge of a 3.6-m straightedge placed parallel with the centerline. Edges of slabs shall be edger finished.

The surface of the approach slab will not be profiled and the Profile Index requirements shall not apply.

Approach slabs shall be cured with pigmented curing compound (1) in conformance with the provisions for curing structures in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. The minimum curing period as specified elsewhere in this section-"Structure Approach Slabs (Type R)" shall be considered to begin at the start of discharge of the last truck load of concrete to be used in the slab. Fogging of the surface with water after the curing compound has been applied will not be required. Should the film of curing compound be damaged from any cause before the approach slab is opened to public traffic, the damaged portion shall be repaired immediately with additional compound, at the Contractor's expense. Any damage to the curing compound after the approach slab is opened to public traffic shall not be repaired.

If the ambient temperature is below  $18^{\circ}\text{C}$  during the curing period, an insulating layer or blanket shall cover the surface. The insulation layer or blanket shall have an R-value rating given in the table below. At the Contractor's option, a heating tent may be used in lieu of or in combination with the insulating layer or blanket:

Temperature range during curing period	R-value, minimum
$13^{\circ}\text{C}$ to $18^{\circ}\text{C}$	1
$7^{\circ}\text{C}$ to $13^{\circ}\text{C}$	2
$4^{\circ}\text{C}$ to $7^{\circ}\text{C}$	3

Tests to determine the coefficient of friction of the final textured surface will be made only if the Engineer determines by visual inspection that the final texturing may not have produced a surface having the specified coefficient of friction. Any tests to determine the coefficient of friction will be made after the approach slab is opened to public traffic, but not later than 5 days after concrete placement. The coefficient of friction will be measured by California Test 342. Any portions of

completed concrete surfaces that are found to have a coefficient of friction less than 0.35 shall be ground or grooved parallel to the center line in conformance with the requirements for bridge decks of Section 42, "Groove and Grind Pavement," of the Standard Specifications.

### **JOINTS**

Hardboard and expanded polystyrene shall conform to the provisions in Section 51-1.12D, "Sheet Packing, Preformed Pads and Board Fillers," of the Standard Specifications.

Type AL joint seals shall conform to the provisions in Section 51-1.12F, "Sealed Joints" of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods.

The pourable seal between the steel angle and concrete barrier shall conform to the requirements for Type A and AL seals in Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods. Immediately prior to placing the seal, the joint shall be thoroughly cleaned, including abrasive blast cleaning of the concrete surfaces, so that all foreign material and concrete spillage are removed from all joint surfaces. Joint surfaces shall be dry at the time the seal is placed.

### **MEASUREMENT AND PAYMENT**

Structural concrete, approach slab (Type R) will be measured and paid for in conformance with the provisions in Sections 51-1.22, "Measurement," and 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for removing and disposing of portions of existing structures and pavement materials, and for furnishing and placing miscellaneous metal, epoxy-coated materials, and pourable seals shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

The quantity of aggregate base (approach slab) to be paid for shall include the actual volume of aggregate base (approach slab) used to fill voids below the reinforced structure approach slab concrete, except for the volume of areas low as a result of over excavation by the Contractor. The volume to be paid for will be calculated on the basis of the constructed length, width and thickness of the filled voids. Structure approach slab concrete used to fill voids lower than the approved grade of the base, except for the areas low as a result of over excavation by the Contractor, will be measured and paid for as aggregate base (approach slab).

No adjustment of compensation will be made for any increase or decrease in the quantity of aggregate base (approach slab) required, regardless of the reason for such increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to the item of aggregate base (approach slab).

The contract price paid per cubic meter for aggregate base (approach slab) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing aggregate base (approach slab) complete in place, including excavation, and removing and disposing of base and subsealing materials, as shown on the plans, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

Full compensation for furnishing, stockpiling and disposing of standby material for construction of temporary structural sections; and for constructing, maintaining, removing and disposing of temporary structural sections shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

Full compensation for drilling and bonding of bar reinforcement or abutment tie rods shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

### **10-1.43 PAVING NOTCH EXTENSION**

This work shall consist of extending existing paving notches in conformance with the details shown on the plans and in conformance with these special provisions.

Concrete for paving notch extension shall be a high-strength material consisting of either magnesium phosphate concrete, modified high alumina based concrete, or portland cement based concrete. Magnesium phosphate concrete shall conform to the provisions for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions. Modified high alumina based concrete and portland cement based concrete shall be water activated and shall conform to the provisions for single component (water activated) magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions.

At least one hour shall elapse between the time of placing concrete for the paving notch extension and placing concrete for the structure approach slab.

A clean uniform rounded aggregate filler may be used to extend the concrete. The moisture content of the aggregate shall not exceed 0.5-percent. Grading of the aggregate shall conform to the following:

Sieve Sizes	Percentage Passing
12.5-mm	100
1.18-mm	0-5

The amount of aggregate filler shall conform to the manufacturer's recommendation, but in no case shall the concrete strengths be less than that specified for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications.

The components of dual component (with a prepackaged liquid activator) magnesium phosphate shall be combined by mixing complete units supplied by the manufacturer. Portions of units shall not be used. Water shall not be added to dual component magnesium phosphate.

Magnesium phosphate concrete shall not be mixed in containers or worked with tools containing zinc, cadmium, aluminum or copper. Modified high alumina based concrete shall not be mixed in containers or worked with tools containing aluminum.

Concrete shall not be retempered. Finishing tools that are cleaned with water shall be thoroughly dried before working the concrete.

When placing concrete on slopes exceeding 5 percent, the Engineer may require the Contractor to provide a flow controlled modified material.

Modified high alumina based concrete and portland cement based concrete shall be cured in conformance with the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. Magnesium phosphate concrete shall not be cured.

The surface temperature of the areas to receive the concrete shall be 5°C or above when the concrete is placed. The contact surface to receive the magnesium phosphate concrete shall be dry. The contact surfaces to receive the modified high alumina concrete or portland cement based concrete may be damp but not saturated.

The construction joint between the paving notch extension and the existing abutment shall conform to the provisions for horizontal construction joints in Section 51-1.13, "Bonding," of the Standard Specifications. Concrete shall be placed in the spalled portions of the existing paving notch concurrently with the concrete for the paving notch extension.

Bar reinforcement shall be epoxy-coated and shall conform to the requirements specified elsewhere in these special provisions.

Structure excavation and backfill shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications.

Drilling of holes and bonding of reinforcing steel dowels shall conform to the provisions for drilling and bonding dowels in Section 83-2.02D(1), "General," of the Standard Specifications.

The quantity of concrete for paving notch extension will be measured by the cubic meter. The volume to be paid for will be calculated from the dimensions shown on the plans or other dimensions that may be ordered in writing by the Engineer.

The contract price paid per cubic meter for paving notch extension shall include full compensation for furnishing all labor, materials (including concrete for the paving notch spalled areas), tools, equipment, and incidentals, and for doing all the work involved in constructing the paving notch extension, complete in place, including structure excavation and backfill, reinforcement, and drilling and bonding dowels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.44 DRILL AND BOND DOWELS**

Drilling and bonding dowels shall conform to the details shown on the plans, the provisions in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions.

Dowels shall conform to the provisions for bar reinforcement in "Reinforcement" elsewhere in these special provisions.

If reinforcement is encountered during drilling before the specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

Unless otherwise provided, dowels to be bonded into drilled holes will be paid for as bar reinforcing steel (epoxy coated)(bridge).

Unless otherwise provided, drilling and bonding dowels will be measured and paid for by the meter determined by the number and the required depth of holes as shown on the plans, or as ordered by the Engineer.

The contract price paid per meter for drill and bond dowel shall include full compensation for furnishing all labor, materials (except reinforcing steel dowels), tools, equipment, and incidentals, and for doing all the work involved in drilling the holes, including coring through reinforcement when approved by the Engineer, and bonding the dowels, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### 10-1.45 POLYESTER CONCRETE OVERLAY

This work shall consist of constructing a polyester concrete overlay in conformance with the details shown on the plans and these special provisions.

Before starting deck overlay work on the project, the Contractor shall submit, for approval by the Engineer, a program for public safety associated with use of methacrylate resin and polyester concrete during the construction of the project. Such program shall identify materials, equipment and methods to be used. The Contractor shall not perform any deck overlay work on the project, other than that specifically authorized in writing by the Engineer, until such program has been approved.

If the measures being taken by the Contractor are inadequate to provide for public safety associated with use of methacrylate resin and polyester concrete, the Engineer will direct the Contractor to revise his operations and his public safety program. Such directions will be in writing and will specify the items of work for which the Contractor's program for public safety associated with use of methacrylate resin and polyester concrete are inadequate. No further work shall be performed on these items until the public safety measures are adequate and, if required, a revised program for public safety associated with use of methacrylate resin and polyester concrete has been approved.

The Engineer will notify the Contractor in writing of the approval or rejection of any submitted or revised program for public safety associated with use of methacrylate resin and polyester concrete in not more than 10 working days following submittal.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised program for public safety associated with use of methacrylate resin and polyester concrete, nor for any delays to the work due to the Contractor's failure to submit an acceptable program for public safety associated with use of methacrylate resin and polyester concrete.

Surface preparation shall be as specified in "Remove Concrete Deck Surface" of these special provisions.

A prime coat shall be applied to the surfaces to be covered with polyester concrete.

When magnesium phosphate concrete is placed prior to the deck overlay, the magnesium phosphate concrete shall be placed at least 72 hours prior to placing the prime coat.

When modified high alumina based concrete is placed prior to the deck overlay, the prime coat shall not be placed on said concrete until at least 30 minutes after final set.

Polyester concrete shall consist of polyester resin binder and dry aggregate. The resin shall be an unsaturated isophthalic polyester-styrene co-polymer conforming to the following:

POLYESTER RESIN BINDER		
PROPERTY	REQUIREMENT	TEST METHOD
* Viscosity	0.075 to 0.20 Pa·s (RVT, No. 1 Spindle, 20 RPM at 25°C)	ASTM D 2196
* Specific Gravity	1.05 to 1.10 at 25°C	ASTM D 1475
Elongation	35 percent, minimum Type I at 11.5 mm/min. Thickness= 6.5±1 mm	ASTM D 638
	Sample Conditioning: 18/25/50 + 5/70	ASTM D 618
Tensile Strength	17.5 MPa, minimum Type I at 11.5 mm/min. Thickness= 6.5±1 mm	ASTM D 638
	Sample Conditioning: 18/25/50 + 5/70	ASTM D 618

* Styrene Content	40 percent to 50 percent (by weight)	ASTM D 2369
Silane Coupler	1.0 percent, minimum (by weight of polyester styrene resin)	
PCC Saturated Surface-Dry Bond Strength	3.5 MPa, minimum at 24 hours and 21±1°C	California Test 551
* Static Volatile Emission	60 gram per square meter, loss, maximum	South Coast Air Quality Management District, Standard Method
* Test shall be performed prior to adding initiator.		

The silane coupler shall be an organosilane ester, gammamethacryloxypropyltrimethoxysilane. The promoter shall be compatible with suitable methyl ethyl ketone peroxide (MEKP) and cumene hydroperoxide (CHP) initiators.

Aggregate for polyester concrete shall conform to the provisions in Section 90-2.02, "Aggregates," of the Standard Specifications and either of the following combined aggregate gradings:

COMBINED AGGREGATE		
Sieve Size	9.5-mm Max. Percent Passing	4.75-mm Sieve Max. Percent Passing
12.5-mm	100	100
9.5-mm	83 - 100	100
4.75-mm	65 - 82	62 - 85
2.36-mm	45 - 64	45 - 67
1.18-mm	27 - 48	29 - 50
600-µm	12 - 30	16 - 36
300-µm	6 - 17	5 - 20
150-µm	0 - 7	0 - 7
75-µm	0 - 3	0 - 3

Aggregate retained on the 2.36-mm sieve shall have a maximum of 45 percent crushed particles when tested in conformance with California Test 205. Fine aggregate shall consist of natural sand only.

Aggregate absorption shall not exceed one percent as determined by California Test 206 and 207.

At the time of mixing with the resin, the moisture content of the aggregate, as determined by California Test 226, shall not exceed one half of the aggregate absorption.

The prepared surface shall receive a wax-free, high molecular weight methacrylate prime coat conforming to the following:



High Molecular Weight Methacrylate (HMWM) Resin		
PROPERTY	REQUIREMENT	TEST METHOD
* Viscosity	0.025 Pa·s, maximum, (Brookfield RVT with UL adaptor, 50 RPM at 25°C)	ASTM D 2196
* Specific Gravity	0.90, minimum, at 25°C	ASTM D 1475
* Flash Point	82°C, minimum	ASTM D 3278
* Vapor Pressure	1.0 mm Hg, maximum, at 25°C	ASTM D 323
Tack-free time	400 minutes, maximum at 25°C	California Test 551
PCC Saturated Surface-Dry Bond Strength	3.5 MPa, minimum at 24 hours and 21±1°C	California Test 551
* Test shall be performed prior to adding initiator.		

The promoter/initiator system for the methacrylate resin shall consist of a metal drier and peroxide. If supplied separately from the resin, at no time shall the metal drier be mixed with the peroxide directly. The containers shall not be stored in a manner that will allow leakage or spillage from one material to contact the containers or material of the other.

A Material Safety Data Sheet shall be furnished prior to use for each shipment of polyester resin binder and high molecular weight methacrylate resin.

The Contractor shall allow 14 days for sampling and testing of the polyester resin binder and high molecular weight methacrylate resin prior to proposed use.

If bulk resin is to be used, the Contractor shall notify the Engineer in writing 10 days prior to the delivery of the bulk resin to the jobsite. Bulk resin is any resin that is stored in containers in excess of 209 liters.

Expansion joints shall be adequately isolated prior to overlaying or may be sawed within four hours after overlay placement, as approved by the Engineer. The exact time of sawing will be determined by the Engineer. Prior to applying the prime coat, the area to receive the prime coat shall be dry and blown clean by compressed air to remove accumulated dust and any other loose material. The surface temperature shall be at least 10°C when the prime coat is applied.

The prime coat shall be uniformly applied to completely cover the surface to receive the polyester concrete. The rate of spread shall be approximately 1.5 square meter per liter.

The prime coat shall be allowed to cure a minimum of 30 minutes before placing polyester concrete. If the primed surface becomes contaminated, the contaminated area shall be cleaned by abrasive blasting and reprimed at the Contractor's expense.

Polyester concrete shall be mixed in mechanically operated mixers. Mixer size shall be limited to a 1/4 cubic meter capacity, unless approved by the Engineer. The polyester resin binder in the concrete shall be approximately 12 percent by weight of the dry aggregate; the exact percentage will be determined by the Engineer.

A continuous mixer, employing an auger screw/chute device, may be approved for use by the Engineer upon demonstrating its ability to produce a satisfactory product. The continuous mixer shall 1) be equipped with a metering device that automatically measures and records the aggregate volumes and the corresponding resin volumes and 2) have a readout gage, visible to the Engineer at all times, that displays the volumes being recorded. The volumes shall be recorded at no greater than 5 minute intervals along with the time and date of each recording. A printout of the recordings shall be furnished to the Engineer at the end of each workshift.

The amount of initiator used in polyester concrete shall be sufficient to produce initial set time between 30 and 120 minutes during placement. The initial set time will be determined by using an initial-setting time Gillmore needle in conformance with the requirements of ASTM Designation: C 266. Accelerators or inhibitors may be required to achieve proper set times and shall be used as recommended by the resin supplier.

The resin binder shall be initiated and thoroughly blended just prior to mixing with aggregate. The polyester concrete shall be mixed a minimum of 2 minutes prior to placing.

Polyester concrete shall be placed prior to gelling and within 15 minutes following addition of initiator, whichever occurs first. Polyester concrete that is not placed within this time shall be discarded.

The surface temperature of the area to receive polyester concrete shall be the same as specified above for the prime coat. The finishing equipment used shall strike off the polyester concrete to the established grade and cross section. Finishing equipment shall be fitted with vibrators or other means of consolidating the polyester concrete to the required compaction.

The polyester concrete shall be consolidated to a relative compaction of not less than 97 percent in conformance with tentative California Test 552.

The finished surface of the polyester concrete overlay shall conform to the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications and these special provisions.

Polyester concrete surfaces shall receive an abrasive sand finish. The sand shall be commercial quality blast sand conforming to the quality and dryness requirements for polyester concrete aggregate as specified in these special provisions. Ninety-five percent of the sand shall pass the 2.36-mm sieve, and 95 percent shall be retained on the 850-µm sieve.

The sand finish shall be uniformly applied immediately after overlay strike-off and before gelling occurs to provide a minimum uniform coverage of 0.4 kilogram per square meter.

The surface texture of polyester concrete surfaces shall be uniform and shall have a coefficient of friction of not less than 0.35 as measured by California Test 342. Any portions of surfaces that do not meet the above provision shall be ground or grooved parallel to the centerline in conformance with the provisions of Section 42, "Groove and Grind Pavement," of the Standard Specifications until the above tolerance is met.

Traffic and equipment shall not be permitted on the overlay for a minimum of 4 hours following final finishing. Overlays shall be protected from moisture for not less than 4 hours after finishing.

Prior to constructing the overlay, one or more trial overlays shall be placed on a previously constructed concrete base to determine the initial set time and to demonstrate the effectiveness of the mixing, placing, and finishing equipment proposed. Each trial overlay shall be 3.6 m wide, at least 1.8 m long, and the same thickness as the overlay to be constructed. Conditions during the construction of the overlay and equipment used shall be similar to those expected and to be used for the construction of the polyester concrete overlay.

All materials used in the trial overlays, including the concrete base shall become the property of the Contractor and shall be removed and disposed of as provided in Section 7-1.13, "Disposal of Material Outside the Right of Way," of the Standard Specifications.

Multilayer polymer concrete overlay conforming to the following provisions may be substituted for polyester concrete overlay:

The Contractor shall submit, in conformance with provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, evidence for 1500 square meters of the polymer concrete that demonstrates 3 years of good performance without any failure of the material. Applications demonstrating good performance shall be at locations with traffic and environmental conditions similar to those that will exist during this project.

Multilayer polymer concrete overlay shall be applied by distributing a polymer binder on the bridge deck surface followed by broadcasting gap-graded aggregate. The overlay thickness shall be between 6 and 9 mm. Surface preparation, placement method and number of layers of resin and aggregate shall be in conformance with the manufacturers recommendations. Surface preparation shown on the plans and as specified in "Prepare Concrete Bridge Deck Surface" of these special provisions shall not apply.

A technical representative from the material manufacturer shall be present during the overlay application.

Surface texture requirements for multilayer polymer concrete overlays shall be the same as those specified for polyester concrete overlays.

Trial overlays for multilayer polymer concrete overlays shall be placed, removed and disposed of in the same manner as specified for polyester concrete overlays.

The minimum time following final finishing before traffic and equipment is permitted on the overlay shall be as recommended by the manufacturer.

Furnishing and placing multilayer polymer concrete overlay will be measured and paid for as place polyester concrete overlay. No separate payment will be made for furnishing materials for the multilayer polymer concrete.

Furnish polyester concrete overlay will be measured by the cubic meter. The volume to be paid for will be determined from calculations based on the quantity of resin binder used and the yield of the specified mix design. The Contractor shall furnish suitable measuring devices to assure correct proportioning of materials and accurate measurements for calculating pay quantities. The pay quantity shall be the calculated quantity of polyester concrete overlay used in the work, exclusive of material used in trial overlays, and any wasted or unused material.

Place polyester concrete overlay will be measured by the square meter. The area to be paid for will be based on the dimensions as shown on the plans.

The contract price paid per cubic meter for furnish polyester concrete overlay shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in furnishing polyester concrete, including polyester resin binder, promoter/initiator and aggregate, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per square meter for place polyester concrete overlay shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing the polyester concrete overlay, complete in place, including application of prime coat and furnishing, constructing and disposing

of trial overlays and base, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for compliance with the requirements for a program for public safety associated with use of methacrylate resin and polyester concrete shall be considered as included in the contract prices paid for the items of work involving polyester concrete overlay and no additional compensation will be allowed therefor.

Full compensation for the surface preparation involved in the use of multilayer polymer concrete shall be considered as included in the contract price paid per square meter for place polyester concrete overlay and no separate payment will be made therefor. No payment will be made for prepare concrete bridge deck surface.

#### 10-1.46 SEALING JOINTS

Joints in concrete bridge decks and joints between concrete structures and concrete approach slabs shall be sealed in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Where polyurethane seals are shown on the plans, silicone sealant conforming to these specifications may be used.

The second through fourth paragraphs of Section 51-1.12F, "Sealed Joints," of the Standard Specifications are amended to read:

Type A and AL joint seals shall consist of a groove in the concrete which is filled with field mixed and placed polyurethane or silicone sealant.

Type B joint seals shall consist of a groove in the concrete which is filled with a preformed elastomeric joint seal.

Joint seal assemblies shall consist of metal or metal and elastomeric assemblies which are anchored or cast into a recess in the concrete over the joint.

The type of seal to be used for the Movement Rating (MR) shown on the plans shall be as follows:

MR	Seal Type
15 mm	Type A or Type B
30 mm	Type A (silicone only) or Type B
> 30 mm and 50 mm	Type B
> 50 mm	joint seal assembly

The first and second paragraphs of Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications are amended to read:

(a) Type A and AL Seal.— The sealant shall consist of a 2 component polyurethane sealant, which will withstand up to  $\pm 25$  percent movement, or a 2 component silicone sealant, which will withstand up to  $\pm 50$  percent movement.

Polyurethane and silicone sealants shall be tested in accordance with California Test 435. The sealants shall conform to State Specification 8030-61J-01 and the following requirements:

SPECIFICATION	REQUIREMENT
Modulus at 150 percent elongation	35-520 kPa
Width of sealant after 7 days extension and one hour recovery	17 mm, max.
Condition 24 hours after notching	Notched or loss of bond 6 mm, max.
Condition of water immersed specimen at 7 days	Notched or loss of bond 6 mm, max.
Condition of specimen when tested in accordance with ASTM Designation: G 53 using FS 40 UV-B bulbs for a minimum of 25 cycles. The cycle shall be 4 hours UV exposure at 60°C and 4 hours condensate exposure at 40°C	No more than slight checking or cracking.
Grease cone penetration	4.5 - 12.0 mm.

State Specifications for polyurethane and silicone sealants may be obtained from the Transportation Laboratory.

Section 51-1.12F(3)(a), "Type A and AL Seal," of the Standard Specifications is amended by adding the following paragraphs after paragraph 8:

A Certificate of Compliance, accompanied by a certified test report, shall be furnished for each batch of polyurethane and silicone sealant in conformance with the provisions in Section 6-1.07, "Certificates of Compliance."

Samples of the two components, not less than one liter each, from each batch of sealant shall be submitted to the Transportation Laboratory. In addition, samples of manufacturer required primers, not less than one liter each, shall be submitted. The samples shall be furnished for testing, with the Certificate of Compliance, 30 days in advance of proposed use.

When ordered by the Engineer, a joint seal larger than called for by the Movement Rating shown on the plans shall be furnished and installed. Payment to the Contractor for furnishing the larger seal and for saw cutting the increment of additional depth of groove required will be determined as provided in Section 4-1.03, "Changes," of the Standard Specifications.

The fifth subparagraph of the second paragraph of Section 51-1.12F(3) (b), "Type B Seal," of the Standard Specifications is amended to read:

The seal shall be furnished full length for each joint with no more than one shop splice in any 18-m length of seal.

One field splice per joint may be made at locations and by methods approved by the Engineer. The seals are to be manufactured full length for the intended joint, then cut at the approved splice section and rematched before splicing. The Contractor shall submit splicing details, prepared by the joint seal manufacturer, to the Engineer for approval prior to beginning splicing work.

The Contractor shall demonstrate the adequacy of the procedures to be used in the work before installing seals in the joints.

Shop splices and field splices shall have no visible offset of exterior surfaces, and shall show no evidence of bond failure.

#### **10-1.47 RAPID SETTING CONCRETE PATCHES**

This work shall consist of cleaning the surfaces and furnishing, placing and finishing concrete patches. Concrete patches shall be placed in accordance with the details shown on the plans, the provisions of the Standard Specifications and these special provisions.

The concrete material shall be a high-strength material consisting of either magnesium phosphate concrete, modified high alumina based concrete, or portland cement based concrete. Magnesium phosphate concrete shall conform to the requirements for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions. Modified high alumina based concrete and portland cement based concrete shall be water activated and shall conform to the requirements for single component (water activated) magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions.

A clean uniform rounded aggregate filler may be used to extend the concrete. The moisture content of the aggregate shall not exceed 0.5 percent. Grading of the aggregate shall conform to the following:

Sieve Size	Percentage Passing
12.5 mm	100
1.18 mm	0-5

The amount of aggregate filler shall conform to the manufacturer's recommendation, but in no case shall the concrete strengths be less than that specified for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications.

Mixing of components of dual component (with a prepackaged liquid activator) magnesium phosphate shall be by complete units, supplied by the manufacturer. Portions of units shall not be used. Water shall not be added to dual component magnesium phosphate.

Cleaning the contact surfaces of existing concrete shall be accomplished by abrasive blast cleaning the concrete and any exposed reinforcing steel, as necessary, to remove all rust, paint, grease, asphalt or other foreign materials. A minimum of 3 mm of concrete shall be removed. Immediately prior to applying the new concrete, the surfaces shall be recleaned by sweeping and pressure jetting, or by other approved means, as necessary to remove any debris which has accumulated during construction or after abrasive blast cleaning. The surface temperature of the areas to be covered shall be 4°C or above when the concrete is applied. Methods proposed to heat said surfaces are subject to approval by the Engineer. The contact surface for the magnesium phosphate concrete shall be dry. The contact surfaces for modified high alumina based concrete or portland cement based concrete may be damp but not saturated.

Magnesium phosphate concrete shall not be mixed in containers or worked with tools containing zinc, cadmium, aluminum or copper. Modified high alumina based concrete shall not be mixed in containers or worked with tools containing aluminum.

Retempering concrete will not be permitted. Finishing tools that are cleaned with water shall be thoroughly dried before working the concrete.

When placing concrete on slopes exceeding 5 percent, the Engineer may require the Contractor to provide a flow controlled modified material.

Modified high alumina based concrete and portland cement based concrete shall be cured in accordance with the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. Magnesium phosphate concrete shall not be cured.

Unless otherwise permitted in writing by the Engineer, traffic shall not be permitted on the new concrete until at least one hour after final set.

Rapid setting concrete (patch) will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

#### **10-1.48 REINFORCED CONCRETE CRIB WALLS**

Reinforced concrete crib walls shall be constructed as shown on the plans and as provided in these special provisions.

Crib walls shall consist of a series of rectangular cells composed of interlocking, precast, reinforced concrete headers, stretchers, and blocks.

Crib members shall be constructed in conformance with the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Reinforcing steel shall conform to ASTM Designation: A 615, Grade 60, or A 706 and reinforcing wire shall conform to ASTM Designation: A 496.

When crib members are fabricated of concrete with a penetration of more than 25 mm, the concrete shall contain not less than 400 kilograms of cement per cubic meter and shall be air-entrained as provided in Section 90-4, "Admixtures," of the Standard Specifications. The air content after mixing and prior to placing shall be  $6.0, \pm 1.5$  percent.

Hoops or stirrups may be reinforcing wire or deformed steel welded wire fabric of the size equivalent to the reinforcing steel shown on the plans. Deformed steel welded wire fabric shall conform to ASTM Designation: A 497.

External vibration resulting in adequate consolidation may be used, at the option of the Contractor.

Concrete test cylinders shall conform to the provisions in Section 90-9, "Compressive Strength," of the Standard Specifications, with the following modifications:

When the penetration of fresh concrete is less than 25 mm, the concrete in the test mold shall be consolidated by vibrating the mold equivalent to the consolidating effort being used to consolidate the concrete in the members.

Crib members shall be cured in conformance with the provisions in Section 90-7.04, "Curing Precast Concrete Members," of the Standard Specifications.

The provisions in Section 51-1.18, "Surface Finishes," of the Standard Specifications will not apply to concrete crib members.

When removed from the forms, the members shall present a true surface of even texture free from honeycombs and voids larger than 25 mm in diameter and 8 mm in depth.

All pockets that are larger than the voids described above shall be cleaned and filled with mortar as directed by the Engineer. Mortar shall conform to the requirements in Section 51-1.135, "Mortar," of the Standard Specifications.

If rock pockets are of the extent or character as to affect the strength of the member materially or to endanger the life of the steel reinforcement, as determined by the Engineer, the member shall be replaced by the Contractor at the Contractor's expense.

The members shall be handled in such a manner as to prevent breakage. Any members that are damaged during handling and placing shall be removed and replaced with new members by the Contractor at the Contractor's expense.

Crib walls shall be placed to the lines and grades established by the Engineer. The foundation for crib walls shall be excavated as shown on the plans and shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications. The foundation shall be approved by the Engineer before any crib members are placed.

Structure backfill for crib walls shall conform to the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications.

Reinforced concrete crib walls will be measured and paid for by the square meter for the type or types set forth in the Engineer's Estimate. The square meter area will be measured on the batter at the outer face for the height from the bottom of the bottom stretcher to the top of the top stretcher and for a length measured from end to end of each section of wall.

The contract prices paid per square meter for reinforced concrete crib wall shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the crib walls,

except excavation and backfill, complete in place, as shown on the plans, as provided in the Standard Specifications and these special provisions, and as directed by the Engineer.

Excavation and backfill for the crib walls will be measured and paid for by the cubic meter as structure excavation (crib wall) and structure backfill (crib wall), respectively.

#### **10-1.49 DOWEL (SMOOTH, EPOXY COATED)**

Dowels shall conform to the details shown on the plans, the provisions in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions.

Dowels shall conform to the provisions for bar reinforcement in "Reinforcement" elsewhere in these special provisions.

Dowel bars shall be required for all transverse weakened plane joints and transverse contact joints as shown on the plans.

Dowel bars shall be placed parallel to the pavement surface and centerline within a tolerance of 13 mm in 460 mm.

The forward movement of the finishing beam or screed shall not be interrupted by the inserting of the dowel bars.

A positive means of marking the locations of the transverse joints shall be provided.

Dowel bars shall be plain, round, smooth, free from burrs or other deformations detrimental to free movement in the concrete, except expansion caps shall be placed at one end of the dowel. Dowel bars of the size and length shown on the plans and with at least one end sawed shall be provided. Dowel bars shall be Corrosion Resistant Dowel Bars meeting the requirements of AASHTO M254, Type B, except the core material shall be of steel meeting the requirements of AASHTO M3 I, grade 300 or 400, or the equivalent, except that the bend test will not be required. The coating material shall meet the coating material requirements of AASHTO M284. The cut ends of the dowel bars shall be coated. An approved parting compound shall be applied uniformly to the epoxy coated bar before the insertion in the concrete. The type of parting compound used shall be as recommended by the coating manufacturer. Certified test results showing compliance with all requirements of AASHTO M254 shall be submitted to the Engineer for approval. In particular, the Contractor's attention is directed to the Pull-Out Test requirement of AASHTO M254. The Pull-Out Test shall be performed on bars to which the proposed parting compound has been applied, and the test report shall identify the type of parting compound used.

Dowel bars shall be placed by one of the following methods:

1. Automatic Dowel Bar Inserter Method.--The automatic dowel bar inserter shall have a successful performance history. The Contractor shall submit documentation regarding performance history of the dowel bar inserter for approval.

The pavement shall be placed and consolidated to full depth before insertion of the dowel bars. Dowel bars shall be inserted into the concrete ahead of the finishing beam or screed.

2. Wire Basket Method.--Wire basket type supports specifically manufactured for this purpose shall be used. The type of dowel supporting baskets as well as the method of anchoring shall be determined by the Contractor. The proposed method of using wire basket supports, including shop drawings of the proposed dowel baskets and proposed method of anchoring the dowel baskets shall be submitted by the Contractor to the Engineer for approval. Dowel bars may be tack welded at alternating ends, to the basket assemblies, to prevent slippage. No portion of the dowel support assembly shall cross the transverse joint.

Dowel bar assemblies shall be securely anchored and constructed to firmly hold all the dowel bars at the specified depth and alignment. Spacer wires shall be removed after the assemblies are staked in position.

Paving shall not be started until the assemblies are in place and approved at least 61 m in advance of the concrete paving. Paving shall be stopped at any time that approved assemblies are not in place at least 61 m in advance of the concrete placement operation. This requirement may be waived by the Engineer upon written request by the Contractor and approval by the Department, in areas where access is restricted, or other construction limitations are encountered.

Approval of the initial placement of basket assemblies shall not constitute acceptance of the final position of the dowel bars.

The concrete shall be consolidated around the dowel bars such that no voids exist. Supplemental use of hand held vibrators will not be allowed.

Regardless of the placement method chosen by the Contractor, after the initial day's placement of the concrete pavement, the Contractor shall suspend his operations until the Engineer has sufficient time to inspect dowel positioning to insure proper placement of the dowels is being achieved.

The Contractor shall perform coring of the initial concrete placement, as directed by the Engineer, as part of the dowel placement tolerance verification. A minimum of six bars shall be cored. Additional coring shall be provided by the Contractor throughout the project to confirm dowel placement as directed by the Engineer.

Dowel positioning will be randomly checked by the Engineer by coring or other methods. Each day's paving will be checked by the Engineer within 2 calendar days by performing one test for every 1672 square meters of doweled pavement or fraction thereof. One test shall consist of drilling 2 cores, one on each end of a dowel bar to expose both ends and allow measurement. If the dowel bars are located incorrectly or air voids exist surrounding the dowel bars, additional cores will be

required to determine the severity. The location of performing the test shall be selected by the Engineer. Joints containing dowels that do not meet specifications will be rejected. The Contractor shall replace rejected joints by an approved method. No additional payment will be made for replacement of slabs and joints required due to joints (dowel placement) not meeting the specified tolerances.

The positioning of dowels shall be controlled by the Contractor in a manner such that dowels meet the specified tolerances. If at any time dowels are found to be installed improperly, the paving operations will be suspended and operations shall not begin until the Contractor has demonstrated to the Engineer that the problem which caused the improper dowel positioning has been corrected.

Contact joints are those made by placing fresh concrete against hardened planned locations.

Concrete on both sides of the longitudinal contact joints shall be connected with tie bars as shown on the plans. Tie bars shall be drilled and epoxied after they have been subjected to a parting compound.

Full compensation for furnishing and placing dowels (including expansion caps) shall be considered as included in the contract price paid per cubic meter for concrete pavement and no separate payment will be made therefor.

#### **10-1.50 REINFORCEMENT**

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

The first paragraph of Section 52-1.02A, "Bar Reinforcement," of the Standard Specifications is amended to read:

**52-1.02A Bar Reinforcement.**—Reinforcing bars shall be low-alloy steel deformed bars conforming to the requirements in ASTM Designation: A 706/A 706M, except that deformed or plain billet-steel bars conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 300 or 420, may be used as reinforcement in the following 5 categories:

1. Slope and channel paving;
2. Minor structures;
3. Sign and signal foundations (pile and spread footing types);
4. Roadside rest facilities; and
5. Concrete barrier Type 50 and Type 60 series and temporary railing.

Deformations specified in ASTM Designation: A 706/A 706M will not be required on bars used as spiral or hoop reinforcement in structures and concrete piles.

Section 52-1.02C, "Welded Wire Fabric," of the Standard Specifications is amended to read:

**52-1.02C Welded Wire Fabric.**—Welded wire fabric shall be either plain or deformed conforming to the requirements in ASTM Designation: A 185 or ASTM Designation: A 497, respectively.

The last paragraph of Section 52-1.07, "Placing," of the Standard Specifications is amended to read:

Whenever a portion of an assemblage of bar reinforcing steel that is not encased in concrete exceeds 6 m in height, the Contractor shall submit to the Engineer for approval, in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," working drawings and design calculations for the temporary support system to be used. The working drawings and design calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California. The temporary support system shall be designed to resist all expected loads and shall be adequate to prevent collapse or overturning of the assemblage. If the installation of forms or other work requires revisions to or temporary release of any portion of the temporary support system, the working drawings shall show the support system to be used during each phase of construction. The minimum horizontal wind load to be applied to the bar reinforcing steel assemblage, or to a combined assemblage of reinforcing steel and forms, shall be not less than 960 Pa on the gross projected area of the assemblage.

The first paragraph of Section 52-1.08, "Splicing," of the Standard Specifications is amended to read:

**52-1.08 Splicing.**—Splicing of reinforcing bars shall be by lapping, butt welding, mechanical butt splicing, or mechanical lap splicing, at the option of the Contractor. Reinforcing bars Nos. 43 through 57 shall not be spliced by lapping.

The sixth paragraph of Section 52-1.08, "Splicing," of the Standard Specifications is amended to read:

Except when otherwise specified, mechanical lap splicing shall conform to the details shown on the plans, the requirements for mechanical butt splices as specified in this Section 52-1.08, and Sections 52-1.08C, "Mechanical Butt Splices," 52-1.08D, "Qualification of Welding and Mechanical Splicing," and 52-1.08E, "Job Control Tests," and the following:

The mechanical lap splice shall be a unit consisting of a sleeve, in which the reinforcing bars are positioned, and a wedge driven through holes in the sleeve and between the reinforcing bars. The mechanical lap splice shall only be used for splicing non-epoxy-coated deformed reinforcing bars Nos. 13, 16 and 19.

The eighth and ninth paragraphs of Section 52-1.08, "Splicing," of the Standard Specifications are amended to read:

Unless otherwise shown on the plans or approved by the Engineer, splices in adjacent reinforcing bars at any particular section shall be staggered. The minimum distance between staggered lap splices or mechanical lap splices shall be the same length required for a lapped splice in the largest bar. The minimum distance between staggered butt splices shall be 600 mm. Distances shall be measured between the midpoints of the splices along a line which is centered between the axes of the adjacent bars.

Completed butt splices shall develop a minimum tensile strength, based on the nominal bar area, of 430 MPa for ASTM Designation: A 615/A 615M, Grade 300 bars, and 550 MPa for ASTM Designation: A 615/A 615M, Grade 420 and ASTM Designation: A 706/A 706M bars. If butt splices are made between 2 bars of dissimilar strengths, the minimum required tensile strength for the splice shall be that required for the weaker bar.

The second sentence of the eleventh paragraph of Section 52-1.08, "Splicing," of the Standard Specifications is amended to read:

Job control tests shall be made on sample splices representing each lot of mechanical butt splices as provided in Section 52-1.08E, "Job Control Tests."

The third and fourth paragraphs of Section 52-1.08A, "Lapped Splices," of the Standard Specifications are amended to read:

Where ASTM Designations: A 615/A 615M, Grade 420 or A 706/A 706M reinforcing bars are required, the length of lapped splices shall be as follows: Reinforcing bars No. 25, or smaller, shall be lapped at least 45 diameters of the smaller bar joined, and reinforcing bars Nos. 29, 32 and 36 shall be lapped at least 60 diameters of the smaller bar joined, except when otherwise shown on the plans.

Where ASTM Designation: A 615/A 615M, Grade 300 reinforcing bars are permitted, the length of lapped splices shall be as follows: Reinforcing bars No. 25, or smaller, shall be lapped at least 30 diameters of the smaller bar joined, and reinforcing bars Nos. 29, 32 and 36 shall be lapped at least 45 diameters of the smaller bar joined, except when otherwise shown on the plans.

Section 52-1.08B, "Butt Welded Splices," of the Standard Specifications is amended to read:

**52-1.08B Butt Welded Splices.**—Butt welded splices in reinforcing bars shall be complete joint penetration butt welds conforming to the requirements in AWS D1.4, and the requirements of these specifications and the special provisions.

At the option of the Contractor, shop produced resistance butt welds, that are produced by a fabricator who is approved by the Transportation Laboratory, may be used. These welds shall conform to the requirements of these specifications and the special provisions.

Only the joint details and dimensions as shown in Figure 3.2, "Direct Butt Joints," of AWS D 1.4-92, shall be used for making complete joint penetration butt welds of bar reinforcement. Split pipe backing shall not be used.

Material used as backing for complete joint penetration butt welds of bar reinforcement shall be a flat plate conforming to the requirements in ASTM Designation: A 709/A 709M, Grade 36[250]. The flat plate shall be 6 mm thick with a width, as measured perpendicular to the axis of the bar, equal to the nominal diameter of the bar, and a length which does not exceed twice the nominal diameter of the bar. The flat plate backing shall be fitted tightly to the bar with the root of the weld centered on the plate. Any bar deformation or obstruction preventing a tight fit shall be ground smooth and flush with the adjacent surface. Tack welds used to fit backing plates shall be within the weld root area so that they are completely consumed by the finished weld. Backing plates shall not be removed.

Butt welds shall be made with multiple weld passes using a stringer bead without an appreciable weaving motion. The maximum stringer bead width shall be 2.5 times the diameter of the electrode and slagging shall be performed between each weld pass. Weld reinforcement shall not exceed 4 mm in convexity.



Before any electrodes or flux-electrode combinations are used, the Contractor, at the Contractor's expense, shall furnish certified copies of test reports for all the pertinent tests specified in AWS A5.1, AWS A5.5, AWS A5.18 or AWS A5.20, whichever is applicable, made on electrodes or flux-electrode combinations of the same class, brand and nearest specified size as the electrodes to be used. The tests may have been made for process qualification or quality control, and shall have been made within one year prior to manufacture of the electrodes and fluxes to be used. The report shall include the manufacturer's certification that the process and material requirements were the same for manufacturing the tested electrodes and the electrodes to be used. The forms and certificates shall be as directed by the Engineer.

Electrodes for manual shielded metal arc welding of ASTM Designation: A 615/A 615M, Grade 420 bars shall conform to the requirements in AWS A5.5 for E9018-M or E10018-M electrodes.

Electrodes for manual shielded metal arc welding of ASTM Designation: A 706/A 706M bars shall conform to the requirements of AWS A5.5 for E8016-C3 or E8018-C3 electrodes.

Solid and composite electrodes for semiautomatic gas metal-arc and flux-cored arc welding of Grade 300 reinforcing bars shall conform to the requirements of AWS A5.18 for ER70S-2, ER70S-3, ER70S-6 or ER70S-7 electrodes; or AWS A5.20 for E70T-1, E70T-5, E70T-6 or E70T-8 electrodes.

Electrodes for semiautomatic welding of ASTM Designation: A 615/A 615M, Grade 420 and ASTM Designation: A 706/A 706M bars shall produce a weld metal deposit with properties conforming to the requirements of Section 5.3.4 of AWS D1.1-96 for ER80S-Ni1, ER80S-Ni2, ER80S-Ni3, ER80S-D2, E90T1-K2 and E91T1-K2 electrodes.

Reinforcing bars shall be preheated for a distance of not less than 150 mm on each side of the joint prior to welding.

For all welding of ASTM Designation: A 615/A 615M, Grade 300 or Grade 420 bars, the requirements of Table 5.2, "Minimum Preheat and Interpass Temperatures," of AWS D1.4-92 are superseded by the following:

The minimum preheat and interpass temperatures shall be 200°C for Grade 300 bars and 300°C for Grade 420 bars. Immediately after completing the welding, at least 150 mm of the bar on each side of the splice shall be covered by an insulated wrapping to control the rate of cooling. The insulated wrapping shall remain in place until the bar has cooled below 90°C.

When welding different grades of reinforcing bars, the electrode shall conform to Grade 300 bar requirements and the preheat shall conform to the Grade 420 bar requirements.

In the event that any of the specified preheat, interpass and post weld cooling temperatures are not met, all weld and heat affected zone metal shall be removed and the splice rewelded.

Welding shall be protected from air currents, drafts, and precipitation to prevent loss of heat or loss of arc shielding. The method of protecting the welding area from loss of heat or loss of arc shielding shall be subject to approval by the Engineer.

Reinforcing bars shall not be direct butt spliced by thermite welding.

The first paragraph of Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications is amended to read:

**52-1.08C Mechanical Butt Splices.**—Mechanical butt splices shall be the sleeve-filler metal type, the sleeve-threaded type, the sleeve-swaged type, the sleeve-filler grout type, the sleeve-lockshear bolt type, the two-part sleeve-forged bar type, or the two-part sleeve-friction bar type, at the option of the Contractor.

The third paragraph of Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications is amended to read:

The total slip of the reinforcing bars within the splice sleeve after loading in tension to 200 MPa and relaxing to 20 MPa shall not exceed the following, measured between gage points clear of the splice sleeve: 250 µm for reinforcing bars No. 43, or smaller, or 750 µm for reinforcing bars No. 57.

The following is added after the third paragraph of Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications:

Slip requirements shall not apply to mechanical lap splices.

The fourth subparagraph of the last paragraph of Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications is amended to read:

4. A statement that the splicing systems and materials used in accordance with the manufacturer's procedures will develop not less than the minimum tensile strengths, based on the nominal bar area, of 430 MPa for ASTM Designation: A 615/A 615M, Grade 300 bars and 550 MPa for ASTM Designations: A 615/A 615M, Grade 420

and A 706/A 706M bars, and will comply with the total slip requirements and the other requirements in these specifications.

Section 52-1.08C(5), "Sleeve-Extruded Mechanical Butt Splices," of the Standard Specifications is amended to read:

**52-1.08C(5) Sleeve-Lockshear Bolt Mechanical Butt Splices.**—The sleeve-lockshear bolt type of mechanical butt splices shall consist of a seamless steel sleeve, 2 serrated steel strips welded to the inside of the sleeve, center hole with centering pin, and bolts that are tightened until the bolt heads shear off and the bolt ends are embedded in the reinforcing bars.

**52-1.08C(6) Two-Part Sleeve-Forged Bar Mechanical Butt Splices.**—The two-part sleeve-forged bar type of mechanical butt splices shall consist of a shop machined two-part threaded steel sleeve that interlocks 2 hot-forged reinforcing bars ends. The forged bar ends may be either shop produced or field produced.

**52-1.08C(7) Two-Part Sleeve-Friction Bar Mechanical Butt Splices.**—The two-part sleeve-friction bar type of mechanical butt splices shall consist of a shop machined two-part threaded steel sleeve whose ends are friction welded, in the shop, to the reinforcing bars ends.

The fourth paragraph of Section 52-1.08D, "Qualification of Welding and Mechanical Splicing," of the Standard Specifications is amended to read:

Each operator qualification test for mechanical splices shall consist of 2 sample splices. Each mechanical splice procedure test shall consist of 2 sample splices.

For sleeve-filler, sleeve-threaded, sleeve-lockshear bolt and two-part sleeve friction bar mechanical butt splices, all sample splices shall be made on the largest reinforcing bar size to be spliced by the procedure or operator being tested except that No. 43 bars may be substituted for No. 57 bars.

For sleeve-swaged and two-part sleeve-forged mechanical butt splices, and mechanical lap splices, all sample splices shall be made on the largest reinforcing bar size of each deformation pattern to be spliced by the procedure or operator being tested. When joining new reinforcing bars to existing reinforcement, the qualification test sample bars shall be made using only the deformation patterns of the new reinforcement to be joined.

Section 52-1.08E, "Job Control Tests," of the Standard Specifications is amended to read:

**52-1.08E Job Control Tests.**—When mechanical butt splices, shop produced complete joint penetration butt welded splices, or shop produced resistance butt welded splices are used, the Contractor shall furnish job control tests from a local qualified testing laboratory. A job control test shall consist of the fabrication, under conditions used to produce the splice, and the physical testing of 3 sample splices for each lot of 150 splices.

A lot of mechanical butt splices is defined as 150, or fraction thereof, of the same type of mechanical butt splices used for each combination of bar size and bar deformation pattern that is used in the work.

A lot of shop produced complete joint penetration butt welded splices, or shop produced resistance butt welded splices, is defined as 150, or fraction thereof, of the same type of welds used for each combination of bar size and bar deformation pattern that is used in the work.

When joining new reinforcing bars to existing reinforcement, the job control test shall be made using only the deformation patterns of the new reinforcement to be joined.

A sample splice shall consist of a splice made at the job site to connect two 760 mm, or longer, bars using the same splice materials, position, location, and equipment, and following the same procedures as are being used to make splices in the work. Shorter sample splice bars may be used if approved by the Engineer.

Sample splices shall be made and tested in the presence of the Engineer or the Engineer's authorized representative.

Sample splices shall be suitably identified with weatherproof markings prior to shipment to the testing laboratory.

For sleeve-threaded mechanical butt splices, the reinforcing bars to be used for job control tests shall be fabricated on a random basis during the cutting of threads on the reinforcing bars of each lot and shipped to the job site with the material they represent.

For shop produced complete joint penetration butt welds, shop produced resistance butt welded splices and all types of mechanical butt splices, except the sleeve-threaded type, the Engineer will designate when samples for job control tests are to be fabricated, and will determine the limits of the lot represented by each job control test.

Should the average of the results of tests made on the 3 sample splices or should more than one sample splice in any job control test fail to meet the requirements for splices, all splices represented by that test will be rejected in accordance with the provisions in Section 6-1.04, "Defective Materials," of the Standard Specifications. This rejection shall prevail

unless the Contractor, at the Contractor's expense, obtains and submits evidence, of a type acceptable to the Engineer, that the strength and quality of the splices in the work are acceptable.

Section 52-1.08F, "Nondestructive Splice Tests," of the Standard Specifications is amended to read:

**52-1.08F Nondestructive Splice Tests.**—All required radiographic examinations of complete joint penetration butt welded splices shall be performed by the Contractor in accordance with the requirements of AWS D 1.4 and these specifications.

Prior to radiographic examination, welds shall meet the requirements of Section 4.4, "Quality of Welds," of AWS D1.4-92.

Radiographic examinations shall be performed on 25 percent of all complete joint penetration butt welded splices from a production lot. The size of a production lot will be a maximum of 100 splices. The Engineer will select the splices which will compose the production lot and also the splices within each production lot to be radiographically examined.

Should more than 12 percent of the splices which have been radiographically examined in any production lot be defective, an additional 25 percent of the splices, selected by the Engineer from the same production lot, shall be radiographically examined. Should more than 12 percent of the cumulative total of splices tested from the same production lot be defective, all remaining splices in the lot shall be radiographically examined.

Additional radiographic examinations performed due to the identification of defective splices shall be at the Contractor's expense.

All defects shall be repaired in accordance with the requirements of AWS D1.4.

Radiographic examinations will not be required for either shop produced complete joint penetration butt welds or shop produced resistance butt welded splices of No. 25 or smaller bars used as spiral or hoop reinforcement.

In addition to radiographic examinations performed by the Contractor, any mechanical or welded splice may be subject to inspection or nondestructive testing by the Engineer. The Contractor shall provide sufficient access facilities in the shop and at the jobsite to permit the Engineer or his agent to perform the inspection or testing.

The Contractor shall notify the Engineer in writing 48 hours prior to performing any radiographic examinations.

The radiographic procedure used shall conform to the requirements of ASME Boiler and Pressure Vessels Code, Section V, Article 2 and the following:

Two exposures shall be made for each complete joint penetration butt welded splice. For each of the two exposures, the radiation source shall be centered on each bar to be radiographed. The first exposure shall be made with the radiation source placed at zero degrees from the top of the weld and perpendicular to the weld root and identified with a station mark of "0." When obstructions prevent a zero degree placement of the radiation source for the first exposure, and when approved in writing by the Engineer, the source may be rotated, around the centerline of the reinforcing bar, a maximum of 25 degrees. The second exposure shall be at 90 degrees to the "0" station mark and shall be identified with a station mark of "90."

For field produced complete joint penetration butt welds, no more than one weld shall be radiographed during one exposure. For shop produced complete joint penetration butt welds, if more than one weld is to be radiographed during one exposure, the angle between the root line of each weld and the direction to the radiation source shall be not less than 65 degrees.

Radiographs shall be made by either X-ray or gamma ray. Radiographs made by X-ray or gamma rays shall have densities of not less than 2.3 nor more than 3.5 in the area of interest. A tolerance of 0.05 in density is allowed for densitometer variations. Gamma rays shall be from the iridium 192 isotope and the emitting specimen shall not exceed 4.45 mm in the greatest diagonal dimension.

The radiographic film shall be placed perpendicular to the radiation source at all times; parallel to the root line of the weld unless source placement determines that the film must be turned; and as close to the root of the weld as possible.

The minimum source to film distance shall be maintained so as to insure that all radiographs maintain a maximum geometric unsharpness of 0.020 at all times, regardless of the size of the reinforcing bars.

Penetrameters shall be placed on the source side of the bar and perpendicular to the radiation source at all times. One penetrometer shall be placed in the center of each bar to be radiographed, perpendicular to the weld root, and adjacent to the weld. Penetrometer images shall not appear in the weld area.

When radiography of more than one weld is being performed per exposure, each exposure shall have a minimum of one penetrometer per bar, or 3 penetrameters per exposure. When 3 penetrameters per exposure are used, one penetrometer shall be placed on each of the 2 outermost bars of the exposure, and the remaining penetrometer shall be placed on a centrally located bar.

An allowable weld buildup of 4 mm may be added to the total material thickness when determining the proper penetrometer selection. No image quality indicator equivalency will be accepted. Wire penetrameters or penetrometer blocks shall not be used.

Penetrameters shall be sufficiently shimmed using a radiographically identical material. Penetrometer image densities shall be a minimum of 2.0 and a maximum of 3.6.

All radiographic film shall be Class 1, regardless of the size of reinforcing bars.

Radiographs shall be free of film artifacts and processing defects, including, but not limited to, streaks, scratches, pressure marks, or marks made for the purpose of identifying film or welding indications.

Each splice shall be clearly identified on each radiograph and the radiograph identification and marking system shall be established between the Contractor and the Engineer before radiographic inspection begins. Film shall be identified by lead numbers only; etching, flashing, or writing in identifications of any type will not be permitted. Each piece of film identification information shall be legible and shall include, as a minimum, the following information: Contractor's name, date, name of nondestructive testing firm, initials of radiographer, contract number, part number, and weld number. The letter "R" and repair number shall be placed directly after the weld number to designate a radiograph of a repaired weld.

Radiographic film shall be developed within a time range of one minute less to one minute more than the film manufacturer's recommended maximum development time. Sight development will not be allowed.

Processing chemistry shall be done with a consistent mixture and quality, and processing rinses and tanks shall be clean to ensure proper results. Records of all developing processes and any chemical changes to the developing processes shall be kept and furnished to the Engineer upon request. The Engineer may request, at any time, that a sheet of unexposed film be processed in the presence of the Engineer to verify processing chemical and rinse quality.

All radiographs shall be interpreted and graded by a Level II or Level III technician who is qualified in accordance with the American Society for Nondestructive Testing's Recommended Practice No. SNT-TC-1A. The results of these interpretations shall be recorded on a signed certification and a copy kept with the film packet.

Technique sheets prepared in accordance with ASME Boiler and Pressure Vessels Code, Section V, Article 2 Section T-291 shall also contain the developer temperature, developing time, fixing duration and all rinse times.

All radiographic envelopes shall have clearly written on the outside of the envelope the following information: name of the Contractor's Quality Control Manager (QCM), name of the nondestructive testing firm, name of the radiographer, date, contract number, complete part description, and all included weld numbers or a report number, as detailed in the Contractor's Quality Control Plan (QCP). In addition, all innerleaves shall have clearly written on them the part description and all included weld numbers, as detailed in the Contractor's QCP.

The third paragraph of Section 52-1.10, "Measurement," of the Standard Specifications is amended to read:

The lap of bars for all splices, including splices shown on the plans where a continuous bar is used, will be measured for payment. The mass calculated shall be based upon the following table:

### BAR REINFORCING STEEL

Deformed Bar Designation Number	Mass Kilogram Per Meter	Nominal Diameter, Millimeters
10	0.560	9.5
13	0.994	12.7
16	1.552	15.9
19	2.235	19.1
22	3.042	22.2
25	3.973	25.4
29	5.060	28.7
32	6.404	32.3
36	7.907	35.8
43	11.38	43.0
57	20.24	57.3
Note: Bar numbers approximate the number of millimeters of the nominal diameter of the bars. The nominal diameter of a deformed bar is equivalent to the diameter of a plain round bar having the same mass per meter as the deformed bar.		

EPOXY-COATED REINFORCEMENT Section 52-1.02B, "Epoxy-coated Bar Reinforcement," of the Standard Specifications is amended to read:

**52-1.02B Epoxy-coated Reinforcement.**—Bar reinforcement to be epoxy-coated shall conform to the ASTM Designation and grade required or permitted by Section 52-1.02A, "Bar Reinforcement," for the location or type of structure involved. The epoxy-coated bar reinforcement shall conform to the provisions of ASTM Designation: A 775/A 775M, except as provided herein. Fabrication and jobsite handling of the epoxy-coated bar reinforcement shall conform to the provisions of ASTM Designation: D 3963/D 3963M, except as provided herein.

Wire reinforcement to be epoxy-coated shall conform to the ASTM Designation and grade required or permitted by Section 52-1.02D, "Reinforcing Wire and Plain Bars," for the location or type of structure involved. The coated wire reinforcement shall conform to the provisions for Class A, Type 1 coating of ASTM Designation: A 884/A 884M, except as provided herein.

Appendices X1, "Guidelines For Job-Site Practices," of ASTM Designations: A 775/A 775M and A 884/A 884M shall apply except as provided herein. The term "shall" shall replace the term "should" in these appendices. Sections X1.2 shall not apply.

All coatings shall be light green in color.

Except for field welding of butt splices, all welding of reinforcement shall be complete prior to epoxy coating the reinforcement.

When any portion of a reinforcing bar or wire requires epoxy coating, the entire bar or wire shall be coated.

Within areas where epoxy-coated reinforcement is required, tie wire and bar chairs or other metallic devices used to secure or support the reinforcement shall be plastic-coated or epoxy-coated to prevent corrosion of the devices or damage to the coated reinforcement.

Prior to coating, the Contractor shall furnish to the Transportation Laboratory a representative 110-g sample from each batch of epoxy coating material to be used. Each sample shall be packaged in an airtight container identified with the manufacturer's name and batch number.

Two 700-mm long samples of coated bar or wire reinforcement from each size and from each load shipped to the jobsite shall be furnished to the Engineer for testing. These samples shall be representative of the material furnished. These samples, as well as any additional random samples taken by the Engineer, may be tested for specification compliance. Such additional sampling, and all tests performed by the Engineer, may be performed at any location deemed appropriate by the Engineer. Failure of any sample to meet the requirements of the specifications will be cause for rejection.

If any bar or wire reinforcement tested for coating thickness or for flexibility of coating fails to meet the requirements for coated bars in Section 8 of ASTM Designation: A 775/A 775M or A 884/A 884M, respectively, 2 retests on random samples taken from bars represented by the failed test will be conducted for each failed test. If the results of both retests meet the specified requirements, the coated bars represented by the samples may be certified as meeting the test requirements.

Epoxy-coated reinforcement shall be covered with an opaque polyethylene sheeting or other suitable protective material to protect the reinforcement from exposure to sunlight, salt spray and weather. For stacked bundles, the protective covering shall be draped around the perimeter of the stack. The covering shall be adequately secured;

however, it should allow for air circulation around the reinforcement to prevent condensation under the covering. Epoxy-coated reinforcement shall not be stored within 300 meters of ocean or tidal water for more than 2 months.

All visible damage to the coatings caused by shipping, handling or installation shall be repaired as required for repairing coating damaged prior to shipment as specified in ASTM Designation: A 775/A 775M for bar reinforcement or ASTM Designation: A 884/A 884M for wire reinforcement. When the extent of coating damage prior to repair exceeds 2 percent of the bar or wire surface area in any 300-mm length, repair of the bar or wire will not be allowed and the coated bar or wire will be rejected.

The patching material and process shall be suitable for field application. The patching material shall be prequalified as required for the coating material and shall be either identified on the container as a material compatible with the bar reinforcement coating, or shall be accompanied by a Certificate of Compliance certifying that the material is compatible with the bar reinforcement coating. Damaged areas shall be patched in accordance with the patching material manufacturer's recommendations. If damage to a bar occurs during field bending the area shall be patched immediately with the prequalified patching material.

Except for lap splices, all splices for epoxy-coated reinforcement shall be coated with a corrosion protection covering that is on the Department's list of approved products. The covering shall be installed in accordance with the manufacturer's recommendations and as directed by the Engineer. The list is available from the Transportation Laboratory.

The third paragraph of Section 52-1.04, "Inspection," of the Standard Specifications is amended to read:

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished for each shipment of epoxy-coated bar or wire reinforcement certifying that the coated bars conform to the requirements of ASTM Designation: A 775/A 775M and Section 52-1.02B, "Epoxy-coated Bar Reinforcement." Said Certificate of Compliance shall include all the certifications specified in ASTM Designation: A 775/A 775M and a statement that the coating material has been prequalified by acceptance testing performed by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

#### **10-1.51 SIGN STRUCTURES**

Sign structures and foundations for overhead signs shall conform to the provisions in Section 56-1, "Overhead Sign Structures," of the Standard Specifications and these special provisions.

Difficult drilling is anticipated due to the presence of cobbles, boulders, hard rock and steep slopes. No additional compensation will be made when difficult drilling is encountered.

At those locations where existing fence, in the opinion of the Engineer, interferes with the Contractor's operation installing sign structures and constructing foundations, the existing fence shall be removed and reconstructed during each work shift at each location that interferes with the Contractor's operations. Conforming to these requirements will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Paragraph 3 in Section 56-1.01, "Description," of the Standard Specifications is amended to read:

Before commencing fabrication of sign structures, the Contractor shall submit 2 sets of working drawings to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings." The working drawings shall include sign panel dimensions, span lengths, post heights, anchorage layouts, proposed splice locations, a snugging and tensioning pattern for anchor bolts and high strength bolted connections, and details for permanent steel anchor bolt templates. The drawings shall be supplemented by a written quality control program listing methods, equipment, and personnel necessary to satisfy the requirements specified herein and in the special provisions.

Working drawings shall be 559 mm x 864 mm or 279 mm x 432 mm in size and each drawing and calculation sheet shall include the sign structure type and reference as shown on the contract plans, District-County-Route, and contract number.

The Engineer shall have 20 working days to review the sign structure working drawings after a complete submittal has been received. No fabrication or installation of sign structures shall be performed until the working drawings are approved in writing by the Engineer.

Should the Engineer fail to complete the review within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the sign structure working drawings, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays."

Section 56-1.02C, "Bolts, Nuts and Washers," of the Standard Specifications is amended to read:

**56-1.02C Bolts, Nuts, and Washers.**—Bolts, nuts, and washers for use in sign structures shall conform to the provisions in Section 55-2, "Materials."

A permanent steel template shall be used to maintain the proper anchor bolt spacing.

One top nut, one leveling nut, and two washers shall be provided for the upper threaded portion of each anchor bolt.

Paragraph 1 in Section 56-1.03, "Fabrication," of the Standard Specifications, with the exception of the title, is deleted.

Paragraph 3 in Section 56-1.03, "Fabrication," of the Standard Specifications is amended by adding the following:

Surfaces of base plates which are to come in contact with concrete, grout, or washers and leveling nuts shall be flat to within 3 mm tolerance in 305 mm, and to within 5 mm tolerance overall. Faying surfaces of plates in high-strength bolted connections including flange surfaces of field splices, chord joints, and frame junctures, and contact surfaces of plates used for breakaway slip base assemblies shall be flat to within 2 mm tolerance in 305 mm, and within 3 mm tolerance overall.

Thermally cut holes made in tubular members of sign supports, other than holes in base and flange plates, shall initially be made a minimum of 2 mm undersized, and then be mechanically enlarged by reaming or grinding to the final required size and shape. All edges shall have a surface roughness of not greater than 6.35  $\mu\text{m}$ . Round holes may be drilled to the exact final diameter. No holes shall be made in members unless the holes are shown on the plans or are approved in writing by the Engineer.

Paragraphs 6 through 13 in Section 56-1.03, "Fabrication," of the Standard Specifications are amended to read:

High-strength bolted connections, where shown on the plans, shall conform to the provisions in Section 55-3.14, "Bolted Connections," except that only fastener assemblies consisting of a high-strength bolt, nut, hardened washer and direct tension indicator shall be used.

High-strength fastener assemblies, and any other bolts, nuts, and washers attached to sign structures shall be zinc-coated by the mechanical deposition process.

An alternating snugging and tensioning pattern for anchor bolts and high-strength bolted splices shall be used. Once tensioned, high-strength fastener components and DTI's shall not be reused.

For bolt diameters less than 10 mm, the diameter of the bolt hole shall be not more than 0.80-mm larger than the nominal bolt diameter. For bolt diameters greater than or equal to 10 mm, the diameter of the bolt hole shall be not more than 1.6 mm larger than the nominal bolt diameter.

Sign structures shall be fabricated into the largest practical sections prior to galvanizing.

Ribbed sheet metal panels for box beam closed truss sign structures shall be fastened to the truss members by cap screws or bolts as shown on the plans, or by 4.76 mm stainless steel blind rivets conforming to Industrial Fasteners Institute, Standard IFI-114, Grade 51. The outside diameter of the large flange rivet head shall be not less than 15.88 mm in diameter. Web splices in ribbed sheet metal panels may be made with similar type blind rivets of a size suitable for the thickness of material being connected.

Any spalling or chipping of concrete structures shall be repaired by the Contractor at the Contractor's expense.

Overhead sign supports shall have an aluminum identification plate permanently attached near the base, adjacent to the traffic side on one of the vertical posts, using either stainless steel rivets or stainless steel screws. As a minimum, the information on the plate shall include the name of the manufacturer, the date of manufacture and the contract number.

Section 56-1.04, "Welding," of the Standard Specifications is amended to read:

**56-1.04 Welding.**— Welding, nondestructive testing (NDT) of welds, and acceptance and repair criteria for NDT of steel overhead sign structure members shall conform to the requirements of AWS D1.1 and the special provisions. Steel members used for overhead sign structures shall receive NDT in conformance with AWS D1.1 and the following:

Weld Location	Weld Type	Minimum Required NDT
Welds for butt joint welds in tubular sections, nontubular sections, and posts	CJP groove weld with backing ring	100% UT or RT
Longitudinal seam welds*	PJP groove weld	25% MT
	CJP groove weld	100% UT or RT
Welds for base plate, flange plate, or end cap to post or mast arm	CJP groove weld	25% UT or RT
	Fillet weld	25% MT
* Longitudinal seam welds shall have 60% minimum penetration, except that within 150 mm of any circumferential weld, longitudinal seam welds shall be CJP groove welds.		

A written procedure approved by the engineer shall be used when performing UT on material less than 8 mm thick. Contoured shoes shall be used when performing UT on round tubular sections under 1270 mm in diameter.

When less than 100 percent of a weld is specified for NDT, and if defects are found during this inspection, additional NDT shall be performed. This additional NDT shall be performed on 25% of the total weld for all similar welds, as determined by the Engineer, produced for sign structures in the project. If any portion of the additional weld inspected is found defective, 100% of all similar welds produced for sign structures in the project, as determined by the Engineer, shall be tested. Circumferential welds and base plate to post welds may be repaired only one time without written permission from the Engineer.

Tubular sign structures shall be galvanized and not painted.

#### **PAYMENT**

Full compensation for furnishing anchor bolt templates and for testing of welds, shall be considered as included in the contract price paid per kilogram for furnish sign structure and no additional compensation will be allowed therefor.

#### **10-1.52 ROADSIDE SIGNS**

Roadside signs shall be installed at the locations shown on the plans or where directed by the Engineer, and shall conform to the provisions in Section 56-2, "Roadside Signs," of the Standard Specifications and these special provisions.

The first three paragraphs of Section 56-2.02B, "Wood Posts," of the Standard Specifications are amended to read:

The grades and species allowed for wood posts, 90 mm x 90 mm in size, are select heart redwood; No. 1 heart structural redwood (1050f); No. 2 heart structural redwood (900f); No. 1 structural light framing Douglas fir, free of heart center; No. 1 structural light framing Hem-Fir, free of heart center; or No. 1 structural light framing Southern yellow pine, free of heart center. The grades and species allowed for wood posts, 90 mm x 143 mm in size, are select heart grade redwood; select heart structural grade redwood (1100f); No. 1 heart structural redwood (950f); No. 2 structural joists and planks, Douglas fir, free of heart center; No. 1 structural joists and planks Hem-Fir, free of heart center; or No. 2 structural joists and planks Southern yellow pine. The grades and species allowed for wood posts larger than 90 mm x 143 mm in size are select heart redwood; No. 1 heart structural redwood (950f); No. 1 posts and timbers (also known as No. 1 structural) Douglas fir, free of heart center; select structural posts and timbers Hem-Fir, free of heart center; or No. 1 timbers Southern yellow pine, free of heart center.

Posts shall be graded in conformance with the provisions in Section 57-2, "Structural Timber." Sweep shall not exceed 25 mm in 3.0 m.

Before preservative treatment, the moisture content of Douglas fir, Hem-Fir, and Southern yellow pine posts shall be not more than 25 percent as measured at the midpoint of the post in the outer 25 mm, using an approved type of moisture meter, in conformance with the requirements of ASTM Designation: D 4444.

All post sizes shown on the plans are metric minimum dressed dry.

#### **10-1.53 TIMBER STRUCTURES**

The first paragraph in Section 57-1.02A, "Structural Timber and Lumber," of the Standard Specifications is amended to read:

Structural timber and lumber shall be of the following species: Douglas fir, Hem-Fir, redwood, or Southern yellow pine, as shown on the plans or as specified in the specifications.



Section 57-2.01, "Description," of the Standard Specifications is amended to read:

Douglas fir timber shall be the species "Pseudotsuga menziesii"; redwood shall be the species "Sequoia sempervirens"; Hem-Fir shall be one of the species "Abies magnifica," "Abies grandis," "Abies procera," "Abies amabilis," "Abies concolor," or "Tsuga heterophylla"; and Southern yellow pine shall be one of the several species recognized by the Southern Pine Inspection Bureau.

The second paragraph in Section 57-2.02, "Grading Rules and Requirements," of the Standard Specifications is amended to read:

Douglas fir and Hem-Fir shall be graded in conformance with the requirements of the current standard grading and dressing rules of the West Coast Lumber Inspection Bureau, or the current standard grading rules of the Western Wood Products Association.

#### **10-1.54 REINFORCED CONCRETE PIPE**

Reinforced concrete pipe shall conform to the provisions in Section 65, "Reinforced Concrete Pipe," of the Standard Specifications and these special provisions.

The relative compaction required below the pipe spring line for pipe in Method 1 backfill in trench, where the pipe is not within the traveled way or under embankment, shall be 85 percent, minimum.

Except as otherwise designated by classification on the plans or in the specifications, joints for culvert and drainage pipes shall conform to the plans or specifications for standard joints.

#### **10-1.55 CORRUGATED METAL PIPE**

Corrugated steel pipe culverts and slotted corrugated steel pipe shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications and these special provisions.

Cross bar spacers for slotted corrugated steel pipe shall be tapered.

Asphaltic mastic coating or polymeric coating substituted for bituminous coating shall be placed on the outside and inside surfaces of the pipe.

Corrugated steel pipe shall be fabricated from zinc-coated steel sheet.

The first paragraph in Section 66-1.03, "Protective Coatings, Linings and Pavings," of the Standard Specifications is amended to read:

**66-1.03 Protective Coatings, Linings and Pavings.**—When required by the special provisions or designated in the Engineer's Estimate, pipes shall be protected with bituminous coating, bituminous lining or have the invert paved with bituminous material or coated with polymerized asphalt. Moisture, dirt, oil, unbonded or incompatible paint, grease, alkalis or other foreign matter shall be removed from the surface to be coated before the coating material is applied.

Section 66-1.03, "Protective Coatings, Linings and Pavings," of the Standard Specifications is amended by adding the following paragraphs after the eighth paragraph:

Polymerized asphalt invert coating shall be applied in conformance with the requirements in ASTM Designation: A 849 for "Invert Paved Type with Polymer Material (Class P)," except that polymerized asphalt coatings shall be applied by immersion to a minimum thickness of 1.3 mm above the crests and troughs of the corrugations of the interior and exterior invert including pipe ends. Polymerized asphalt material shall conform to the "Requirements for Polymer Coating" contained in ASTM Designation: A 742/A 742M, and the following:

Polymerized asphalt shall be hot-applied thermoplastic material containing a minimum of 7.0 percent styrene-butadiene-styrene block copolymer.

There shall be not more than 6.4 mm undercutting or delamination from the scribe when a minimum 300 mm by 300 mm coupon cut from the coated pipe is exposed for 1000 hours in accordance with the requirements in ASTM Designation: B 117. Cut edges shall be sealed by dipping in a sample of the polymerized asphalt coating heated to the manufacturer's recommended application temperature. There shall be no corrosion or delamination from the sealed edges following exposure as specified.

The last paragraph in Section 66-1.03, "Protective Coatings, Linings and Pavings," of the Standard Specifications is amended to read:

Damaged protective coatings, linings and invert paving shall be repaired by the Contractor at the Contractor's expense. Bituminous material conforming to the requirements in AASHTO Designation: M 190 or other materials approved by the Engineer shall be used to repair damaged bituminous coatings; asphalt mastic material conforming to the requirements in AASHTO Designation: M 243 shall be used to repair damaged asphalt mastic coatings; and tar base material conforming to the provisions of AASHTO Designation: M 243 shall be used to repair damaged polymeric coatings. The repair of damaged polymerized asphalt coatings shall conform to the requirements in ASTM Designation: A 762, Section 11, "Repair of Damaged Coatings."

Section 66-3.06, "Damaged Aluminum Coatings," of the Standard Specifications is amended to read:

**66-3.06 Damaged Aluminum Coatings.**—In lieu of the requirements in AASHTO Designation: M 36/M 36M, damaged aluminum coatings shall be repaired as provided for damaged galvanizing in Section 75-1.05, "Galvanizing," or Section 66-3.05, "Damaged Galvanizing."

Full compensation for remove pipe and 600 mm corrugated steel pipe (2.01 mm Thick) shall be considered as included in the contract price paid per meter for 525 mm plastic pipe-liner and no separate payment will be made therefor.

#### **10-1.56 OVERSIDE DRAINS**

Steel entrance tapers, steel downdrain slip joints, anchor assemblies and corrugated steel pipe downdrains shall conform to the provisions in Section 69, "Overside Drains," of the Standard Specifications and these special provisions.

Steel entrance tapers, steel downdrain slip joints, and pipe downdrains shall be fabricated from zinc-coated steel sheet.

#### **10-1.57 OVERSIDE DRAINS**

Asphalt concrete overside drains shall conform to the provisions in Section 69, "Overside Drains," of the Standard Specifications.

#### **10-1.58 MISCELLANEOUS FACILITIES**

Steel flared end sections shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications.

#### **10-1.59 SLOPE PROTECTION**

Slope protection shall conform to the provisions in Section 72, "Slope Protection," of the Standard Specifications and these special provisions.

Rock slope protection fabric shall be nonwoven type fabric, Type A or Type B, at the option of the Contractor.

#### **10-1.60 MISCELLANEOUS CONCRETE CONSTRUCTION**

Minor concrete (curb and sidewalk) shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications.

#### **10-1.61 MISCELLANEOUS IRON AND STEEL**

Miscellaneous iron and steel shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications.

#### **10-1.62 CHAIN LINK FENCE**

Chain link fence and gates shall be Type CL-1.8 and shall conform to the provisions in Section 80, "Fences," of the Standard Specifications.

#### **10-1.63 MARKERS AND DELINEATORS**

Markers and delineators shall conform to the provisions in Section 82, "Markers and Delineators," of the Standard Specifications and these special provisions.

Concrete barrier markers (non-impactable) and concrete barrier delineators (400 mm), shall be as specified in "Prequalified and Tested Signing and Delineation Materials," elsewhere in these special provisions. The concrete barrier markers (non-impactable) and concrete barrier delineators (400 mm), shall be cemented to the median barrier with rapid set

type epoxy adhesive as provided for cementing pavement markers to pavement in Section 85-1.06, "Placement." of the Standard Specifications. Rapid set type epoxy adhesive shall conform to the requirements in Section 95-2.04 "Rapid Set Epoxy Adhesive for Pavement Markers" of the Standard Specifications. Concrete barrier markers (non-impactable) and concrete barrier delineators (400 mm), shall be applied only on clean dry surfaces.

Quantities of concrete barrier markers (non-impactable) and concrete barrier delineators (400 mm), to be paid for will be determined as units from actual count in place.

The contract unit prices paid for concrete barrier marker (non-impactable) and concrete barrier delineator (400 mm), shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing concrete barrier markers and concrete barrier delineators, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Markers and delineators on flexible posts shall be as specified in "Approved Traffic Products" of these special provisions. Flexible posts shall be made from a flexible white plastic which shall be resistant to impact, ultraviolet light, ozone and hydrocarbons. Flexible posts shall resist stiffening with age and shall be free of burns, discoloration, contamination, and other objectionable marks or defects which affect appearance or serviceability.

Reflective sheeting for metal and flexible target plates shall be the reflective sheeting designated for channelizers, markers, and delineators specified in "Approved Traffic Products" of these special provisions.

Concrete pavement anchor markers shall conform to the details shown on the plans.

The contract unit price paid for marker (concrete pavement anchor) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing marker (concrete pavement anchor), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.64 MODIFIED METAL BEAM GUARD RAILING (TYPE A)**

Modified metal beam guard railing (Type A) shall conform to the details shown on the plans and to the provisions in Section 83-1, "Railings," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" of these special provisions.

Line posts and blocks shall be wood.

The ninth, eleventh and twelfth paragraphs in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications are amended to read:

The grades and species of wood posts and blocks shall be No. 1 timbers (also known as No. 1 structural) Douglas fir or No. 1 timbers Southern yellow pine. Wood posts and blocks shall be graded in conformance with the provisions in Section 57-2, "Structural Timber," except allowances for shrinkage after mill cutting shall in no case exceed 5 percent of the American Lumber Standards minimum sizes, at the time of installation.

Wood posts and blocks shall be pressure treated after fabrication as provided in Section 58, "Preservative Treatment of Lumber, Timber and Piling," with creosote, creosote coal tar solution, creosote-petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate. In addition to the preservatives listed above, Southern yellow pine may also be pressure treated with chromated copper arsenate. When other than one of the creosote processes is used, blocks shall have a minimum retention of 6.4 Kg/m<sup>3</sup>, and need not be incised.

If copper naphthenate, ammoniacal copper arsenate, chromated copper arsenate, or ammoniacal copper zinc arsenate is used to treat the wood posts and blocks, the bolt holes shall be treated as follows:

Before the bolts are inserted, bolt holes shall be filled with a grease, recommended by the manufacturer for corrosion protection, which will not melt or run at a temperature of 65°C.

**TERMINAL SYSTEM (TYPE SRT).**—Terminal system (Type SRT) shall be furnished and installed as shown on the plans, and as specified in these special provisions.

Terminal system (Type SRT) shall be a SRT-350 Slotted Rail Terminal as manufactured by Syro, Inc., a Trinity Industries Company, and shall include all the items detailed for terminal system (Type SRT) shown on the plans.

Arrangements have been made to insure that any successful bidder can obtain the SRT-350 Slotted Rail Terminal from the manufacturer, Syro, Inc., a Trinity Industries Company, P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone (800) 772-7976. The price quoted by the manufacturer for the SRT-350 Slotted Rail Terminal, FOB Centerville, Utah is \$865.00, not including sales tax.

The above price will be firm for orders placed on or before December 31, 2000, provided delivery is accepted within 90 days after the order is placed.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance

shall certify that terminal systems (Type SRT) conform to the contract plans and specifications, conform to the prequalified design and material requirements and were manufactured in conformance with the approved quality control program.

The terminal system (Type SRT) shall be installed in conformance with the manufacturer's installation instructions and these requirements. At the Contractor's option, steel foundation tubes with soil plates attached, shall be either driven, with or without pilot holes, or placed in drilled holes. Any space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. Wood terminal posts shall be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the terminal system (Type SRT) has been constructed shall be disposed of in a uniform manner along the adjacent roadway as directed by the Engineer.

The quantity of terminal systems (Type SRT) will be measured as units determined from actual count in place in the completed work.

The contract unit price paid for terminal system (Type SRT) shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in furnishing and installing terminal system (Type SRT), complete in place, including excavation, backfill and disposal of surplus material and connecting the terminal system to new or existing metal beam guard railing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.65 CONCRETE BARRIER**

Concrete barriers shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

Barrier opening shall be constructed in shoulder barrier railing at the location and in accordance with the details shown on the plans. Full compensation for constructing barrier opening shall be considered as included in the contract price paid per meter for concrete barrier (Type 732) and no separate payment will be made therefor.

Concrete barrier markers shall be as specified in "Approved Traffic Products" of these special provisions. At the locations designated on the plans, concrete barrier markers shall be cemented to the barrier in conformance with the manufacturer's recommendations.

Concrete for barriers shall be integral colored concrete using a color-conditioned admixture. The color-conditioned admixture shall be a commercially manufactured, single-component pigmented, water-reducing concrete admixture containing no calcium chloride. The color-conditioned admixture shall be certified to conform to ASTM C494 and C979. The color-conditioned admixture shall be factory formulated and packaged in 0.765 cubic meter (1.0 cubic yard) increments, not as multiple additives and pigments dosed separately into the mix. The integral colored concrete shall contain the proper proportion of color-conditioned admixture per the manufacturer's specifications based upon cement content. If the mix contains cement substitutes such as fly-ash or blast furnace slag, their weights shall be added to the weight of the cement to determine the correct dosage of color-conditioned admixture.

The finished color of the concrete barriers shall be a medium to light brown earth tone comparable to L. M. Scofield's C-25, "Coachella Sand"; Davis's #641, "Sequoia Sand"; or QC Construction Products' IC-2, "Leather".

At least thirty (30) days prior to commencing with the concrete barrier work, the Contractor shall submit a 1.0m x 1.0m x 0.1m test panel of the integral color concrete along with the manufacturer's catalog cuts, product data and safety sheets, and applicable certifications for approval by the Resident Engineer. The test panel shall be cured with the appropriate curing compound and finished per Section 83 2.02D(4), "Finishing," of the Standard Specifications. The Contractor shall not proceed with the concrete barrier work until the Resident Engineer has approved the test panel in writing with concurrence by the District Landscape Architect. For comparison purposes, the approved test panel shall be retained on-site until all integral color concrete work is completed.

The concrete admixture shall be added at the batch plant, and the minimum batch size shall be 2.29 cubic meters (3.0 cubic yards). The same brand of cement, source of sand, and water/cement ratio shall be for each load of the same color.

Full compensation for constructing and providing the integral colored test panel and for the colored-conditioned admixture shall be considered as included in the contract price paid per meter for concrete barrier of the types listed in the Engineer's Estimate and no additional compensation will be allowed therefor.

The subparagraphs in the second paragraph in Section 83-2.02D(1), "General," of the Standard Specifications are amended to read:

- a. For concrete barriers Type 50 series and Type 60 series, the top shall not vary more than 6 mm from the edge of the straightedge and the faces shall not vary more than 12 mm from the edge of the straightedge.
- b. For concrete barriers other than Type 50 series and Type 60 series, both the top and faces shall not vary more than 6 mm from the edge of the straightedge.

The eighth paragraph in Section 83-2.02D(1), "General," of the Standard Specifications is amended to read:

Granular material for backfill between the 2 walls of concrete barriers (Type 50E), (Type 60E), (Type 60GE), and (Type 60SE), as shown on the plans, shall be placed without compaction.

The first, second, third, and eighth paragraphs in Section 83-2.02D(2), "Materials," of the Standard Specifications are amended to read:

**83-2.02D(2) Materials.**—Type 50 and Type 60 series concrete barriers shall be constructed of minor concrete conforming to the provisions in Section 90-10, "Minor Concrete," except as follows:

- a. The maximum size of aggregate used for extruded or slip-formed concrete barriers shall be at the option of the Contractor, but in no case shall the maximum size be larger than 37.5 mm nor smaller than 9.5 mm.
- b. If the 9.5-mm maximum size aggregate grading is used to construct extruded or slip-formed concrete barriers, the cement content of the minor concrete shall be not less than 400 kg/m<sup>3</sup>.

Concrete barriers other than Type 50 and Type 60 series shall be constructed of Class 2 concrete conforming to the provisions in Section 90, "Portland Cement Concrete."

The concrete paving between the tops of the 2 walls of concrete barrier (Type 50E), (Type 60E), (Type 60GE), and (Type 60SE) and the optional concrete slab at the base between the 2 walls of concrete barrier (Type 50E), (Type 60E), (Type 60GE), and (Type 60SE) shall be constructed of minor concrete conforming to the provisions of Section 90-10, "Minor Concrete," except that the minor concrete shall contain not less than 300 kg of cement per cubic meter.

Granular material for backfill between the 2 walls of concrete barrier (Type 50E), (Type 60E), (Type 60GE), and (Type 60SE) shall be earthy material suitable for the purpose intended, having no rocks, lumps or clods exceeding 37.5 mm in greatest dimension.

The first and second paragraphs in Section 83-2.02D(3), "Construction Methods," of the Standard Specifications are amended to read:

**83-2.02D(3) Construction Methods.**—Type 50 series and Type 60 series concrete barriers shall be constructed by either the "cast-in-place with fixed forms" method or the "extrusion or slip-form" method or a combination thereof, at the Contractor's option.

Concrete barriers other than Type 50 series and Type 60 series shall be constructed by the "cast-in-place with fixed forms" method.

Section 83-2.02D(4), "Finishing," of the Standard Specifications is amended to read:

**83-2.02D(4) Finishing.**—The surface finish of concrete barriers Type 50 series and Type 60 series, prior to the application of the curing compound, shall be free from surface pits larger than 25 mm in diameter and shall be given a final soft brush finish with strokes parallel to the line of the barriers. Finishing with a brush application of grout will not be permitted.

To facilitate finishing, fixed forms for cast-in-place concrete barriers Type 50 series and Type 60 series, shall be removed as soon as possible after the concrete has set enough to maintain the shape of the barrier without support.

Not less than 7 days after placing, exposed surfaces of concrete barriers, Type 50 series and Type 60 series, shall receive a light abrasive blast finish so that a uniform appearance is achieved.

The final surface finish of concrete barriers other than Type 50 series and Type 60 series shall be Class 1 Surface Finish as specified in Section 51-1.18B, "Class 1 Surface Finish." Alternative final surface finish methods proposed by the Contractor shall be submitted in writing and shall not be used unless approved by the Engineer.

Section 83-2.02D(5), "Curing," of the Standard Specifications is amended to read:

**83-2.02D(5) Curing.**—Exposed surfaces of concrete barriers shall be cured with the non-pigmented curing compound (6) as provided in Section 90-7.01B, "Curing Compound Method." At the Contractor's option, the formed surfaces of concrete barriers, which are on bridges or walls but which do not support soundwalls, may be cured as provided in Section 90-7.01D, "Forms-In-Place Method," except the forms shall be retained in place for a minimum period of 12 hours after the concrete has been placed. When curing Type 50 series and Type 60 series concrete barriers, curing compound shall be applied by a mechanical sprayer capable of applying the curing compound to at least one

entire side and the top of the concrete barrier in one application at a uniform rate of coverage. The spray shall be adequately protected against wind.

The ninth and tenth paragraphs in Section 83-2.03, "Measurement," of the Standard Specifications are amended to read:

Concrete barriers, except (Type 50E), (Type 60E), (Type 60GE) and (Type 60SE), will be measured along the top of the barrier.

Concrete barriers (Type 50E), (Type 60E), (Type 60GE), and (Type 60SE) will be measured once along the center-line between the 2 walls of the barrier.

The fourth paragraph in Section 83-2.04, "Payment," of the Standard Specifications is amended to read:

The contract prices paid per meter for concrete barrier of the type or types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the concrete barriers, complete in place, including bar reinforcing steel, steel dowels and drilling and bonding dowels in structures, hardware for steel plate barrier, miscellaneous metal, concrete barrier markers, excavation, backfill (including concrete paving, granular material and concrete slab used as backfill in concrete barriers (Type 50E), (Type 60E), (Type 60GE), and (Type 60SE)), and disposing of surplus material and for furnishing, placing, removing and disposing of the temporary railing for closing the gap between existing barrier and the concrete barrier being constructed, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

#### **10-1.66 THERMOPLASTIC TRAFFIC STRIPES (SPRAYABLE)**

Sprayable thermoplastic traffic stripes (traffic lines) shall conform to the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

Sprayable thermoplastic material shall conform to the requirements of the Department of Transportation Specification PTH 392B, for Thermoplastic Traffic Striping Material, Sprayable, White and Yellow.

The second and third sentences of Section 84-2.02, "Materials," of the Standard Specifications are amended to read:

Glass beads to be applied to the surface of the molten thermoplastic material shall conform to the requirements of State Specification 8010-004 (Type II).

State Specifications for thermoplastic material and glass beads may be obtained from the Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, CA 95819-4612, Telephone 916-227-7289.

Sprayable thermoplastic traffic stripes shall be applied in conformance with the requirements specified for applying thermoplastic traffic stripes, except for the following:

Sprayable thermoplastic material for traffic stripes shall be applied by spray methods in a single uniform layer at the minimum thickness of 0.76-mm.

Sprayable thermoplastic material shall be applied to the pavement at a temperature between 177°C and 205°C, unless a different temperature is recommended by the manufacturer.

Sprayable thermoplastic traffic stripes will be measured by the meter along the line of the traffic stripes, without deductions for gaps in broken traffic stripes. A double traffic stripe, consisting of two, 100 mm wide yellow stripes will be measured as one traffic stripe.

The contract price paid per meter for thermoplastic traffic stripe (sprayable) shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in applying sprayable thermoplastic traffic stripes (regardless of the number, widths, and patterns of individual stripes involved in each traffic stripe) including establishing alignment for stripes, and layout work, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.67 THERMOPLASTIC TRAFFIC STRIPES (RECESSED)**

Thermoplastic traffic stripes (recessed) shall conform to the provisions in Sections 84-1, "General," and 84-2, "Thermoplastic Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

The second and third sentences of Section 84-2.02, "Materials," of the Standard Specifications are amended to read:

Glass beads to be applied to the surface of the molten thermoplastic material shall conform to the requirements of State Specification 8010-004 (Type II).

State Specifications for thermoplastic material and glass beads may be obtained from the Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, CA 95819-4612, Telephone 916-227-7289.

Thermoplastic materials for recessed applications shall be formulated for use in freeze-thaw environments and shall comply in all respects to Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications except:

When tested according to California Test 423, white material shall have a maximum Yellowness Index of 8.  
White and yellow thermoplastic materials shall have Hardness values between 40 and 60.  
Materials shall be extruded type.

In addition to other labeling requirements, packages of thermoplastic shall be clearly marked "FOR RECESSED APPLICATION".

Possible suppliers:

Cataphote, Inc.  
P.O. Box 2369  
Jackson, MS 39225-2369  
Phone 1-800-221-2574

Stimsonite Corporation  
P.O. Box 94108  
Atlanta, GA 30318  
Phone 1-800-327-5917

Morton International  
1021 North Mission Blvd.  
Los Angeles, CA 90033  
Phone 1-800-338-7680

Pavement recesses shall be constructed in new or existing pavement. The method of recess construction shall be selected by the Contractor. Equipment for recess construction shall be power-operated, mechanical and capable of removing the pavement to the dimensions shown on the plans. Parallel recesses for double-yellow lines shall be cut in a single pass using an appropriate cutting head.

Residue from recessing operations shall be picked up and removed from the roadbed by use of vacuum attachment to the recessing equipment and shall not be permitted to flow across the pavement, flow into gutters or drainage facilities, or be left on the surface of the pavement. Residue shall be removed from pavement surfaces immediately before such residue is blown by action of traffic or wind.

Residue from recess operation shall be immediately removed from the site of work and disposed of as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

All recesses shall be completely clean and dry before applying thermoplastic. A power-operated blower shall be used to remove debris from recesses prior to thermoplastic application.

All recesses shall be restriped prior to the end of each work shift and before the road is opened to public traffic.

The contract price paid per meter for thermoplastic traffic stripe (recessed) of the widths and patterns designated in the Engineers Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and placing thermoplastic traffic stripe in pavement recesses, complete in place, including constructing the recess regardless of the type of recess required and removing and disposing of residue from recess construction, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.68 PAINT PAVEMENT MARKINGS**

Painting pavement markings shall conform to the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

The subparagraphs of the first paragraph in Section 84-3.02, "Materials," of the Standard Specifications are amended to read:

Solvent Borne, Acrylic Copolymer Traffic Line.—White, Yellow and Black  
Water Borne, Traffic Line.—White, Yellow and Black

State Specification No.  
PT-170-A  
8010-20A

The second and third paragraphs in Section 84-3.02, "Materials," of the Standard Specifications are amended to read:

Glass beads shall conform to State Specification 8010-004 (Type II).

State Specifications for traffic paint and glass beads may be obtained from the Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, CA 95819-4612, Telephone 916-227-7289.

Blue paint pavement markings shall be commercial quality and shall conform to Federal Number 15090 for Highway Blue.

#### **10-1.69 PAVEMENT MARKERS**

Pavement markers shall conform to the provisions in Section 85, "Pavement Markers," of the Standard Specifications.

### **SECTION 10-2. (BLANK)**

### **SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS**

#### **10-3.01 DESCRIPTION**

Highway lighting, traffic monitoring systems, closed circuit television systems (CCTV), changeable message sign system (CMS), sign lighting, fiber optic backbone system and highway advisory radio (HAR) system and extinguishable message sign systems (EMS) shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

#### **10-3.02 COST BREAK-DOWN**

The Contractor shall furnish to the Engineer a cost break-down for each contract lump sum item of work described in this Section 10-3.

The Contractor shall determine the quantities required to complete the work shown on the plans. The quantities and values shall be included in the cost break-down submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-down submitted for approval.

No adjustment in compensation will be made in the contract lump sum prices paid for the various electrical work items due to any differences between the quantities shown in the cost break-down furnished by the Contractor and the quantities required to complete the work as shown on the plans and as specified in these special provisions.

The cost break-down shall be submitted to the Engineer for approval within 15 days after the contract has been approved. The cost break-down shall be approved, in writing, by the Engineer before any partial payment for the items of electrical work will be made.

At the Engineer's discretion the approved cost break-down may be used to determine partial payments during the progress of the work and as the basis of calculating the adjustment in compensation for the item or items of electrical work due to changes ordered by the Engineer. When an ordered change increases or decreases the quantities of an approved cost break-down, the adjustment in compensation may be determined at the Engineer's discretion in the same manner specified for increases and decreases in the quantity of a contract item of work in accordance with Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.

The cost breakdown shall, as a minimum, include the following items:

- foundations - each type including service, controller and demarcation foundation
- standards and poles - list by each type
- conduit - list by each size and installation method
- pull boxes - each type
- conductors - each size and type
- service equipment enclosures-each type by wiring diagram
- telephone demarcation box
- extinguishable message sign
- signal heads and hardware - each type
- loop detectors - each type and size
- luminaires - each type
- closed circuit television (CCTV) Systems



Changeable message signs  
fiber optic communication system  
training  
highway advisory radio (HAR) System

Full compensation for preparing and furnishing the cost break-down for each lump sum electrical item shall be considered as included in the contract lump sum price paid for the various items of electrical work and no additional compensation will be allowed therefor.

### 10-3.03 EXCAVATING AND BACKFILLING

The third paragraph in Section 86-2.01, "Excavating and Backfilling", of the Standard Specifications is amended to read:

The excavations shall be backfilled in conformance with the provisions in Section 19-3, "Structure Excavation and Backfill." Backfill placed in conduit trenches to be outside the hinge point of slopes and not under pavement shall be compacted to a relative compaction of not less than 90 percent. Backfill within the hinge points and in areas where pavement is to be constructed shall be compacted to a relative compaction of not less than 95 percent.

### 10-3.04 CONDUIT

Conduit to be installed underground shall be Type 3 unless otherwise specified. Detector termination conduits shall be Type 3.

The conduit between a foundation and the nearest pull box shall be the same type as in the foundation.

Conduit sizes shown on the plans and specified in the Standard Specifications and these special provisions are referenced to metallic type conduit. When rigid non-metallic conduit is required or allowed, the nominal equivalent industry size shall be used as shown in the following table:

Size Designation for Metallic Type Conduit	Equivalent Size for Rigid Non-metallic Conduit
21	20
27	25
41	40
53	50
63	65
78	75
103	100

Conduit runs shown on the plans to be located behind curbs or outside the shoulder may be installed in the street, within 0.9-m of, and parallel to the face of the curb or the edge of the shoulder, by the trenching in pavement method described in Section 86-2.05C. All pull boxes shall be located behind the curb outside the shoulder or at the locations shown on the plans.

After conductors have been installed, the ends of conduits terminating in service and controller cabinets shall be sealed with an approved type of sealing compound.

At locations where conduit is required to be installed under pavement and existing underground facilities require special precautions, as described in "Obstructions" of these special provisions, conduit shall be placed by the "Trenching in Pavement Method" as specified in Section 86-2.05C, "Installation," of the Standard Specifications.

At other locations where conduit is required to be installed under pavement and if delay to any vehicle will not exceed 5 minutes, conduit may be installed by the "Trenching in Pavement Method."

Pull ropes for use when installing cables in Type 3 conduit shall consist of a flat, woven, lubricated, soft-fiber polyester tape with a minimum tensile strength of 8000 N and shall have printed sequential measurement markings at least every meter.

At the option of the Contractor, the final 0.6-m of conduit entering a pull box in a reinforced concrete structure may be Type 4.

### 10-3.05 PULL BOXES

Grout shall be placed in bottom of pull boxes.

Green non reflective tape for pull box markers will be State-furnished as provided under "State Furnished Materials" of these special provisions.

Pull boxes shall be the non-PCC type when not in a concrete surface, asphalt concrete surface, or where the pull box is not adjacent to a standard.

A pull box marker shall be placed at each pull box not in a concrete surface, asphalt concrete surface, or where the pull box is not adjacent to a standard. Markers shall comply with Class 1, Flexible Post Delineators as shown on Standard Plan

Sheet A73C except no reflectorization will be required. A State-furnished non-reflective green identification strip shall be applied to each marker.

Full compensation for furnishing and installing pull box markers and applying State-furnished green identification strips shall be considered as included in the contract lump sum price paid for the electrical work requiring the pull box marker and no separate payment will be made therefor.

### 10-3.06 TRAFFIC PULL BOXES

Traffic pull boxes and covers shall have a vertical proof-load strength of 111 kN. The 111 kN load shall be distributed through a 229-mm x 229-mm x 51-mm steel plate according to Federal Specification RR-F-621e. This load shall be placed anywhere on the box and cover for a period of one minute without causing any cracks or permanent deformations.

The No. 3 1/2(T) and No. 5(T) pull boxes shall be reinforced with a galvanized Z-bar welded frame and cover similar to that shown on the plans for No. 6(T) pull boxes. Frames shall be anchored to the boxes by means of 6-mm x 57-mm long concrete anchors. Four concrete anchors shall be provided for the No. 3 1/2(T) pull box, one placed in each corner. Six concrete anchors shall be provided for each No. 5(T) and No. 6(T) pull box, one placed in each corner and one placed near the middle of each of the longer sides.

Hold down screws shall be 9-mm hex flange cap screws of Type 316 stainless steel. The nut shall be zinc plated carbon steel and shall be made vibration resistant with a wedge ramp at the root of the thread. The nut shall be spot welded to the underside of, or fabricated with, the galvanized Z-bar pull box frame.

Steel covers shall be countersunk approximately 6 mm to accommodate the bolt head. The bolt head shall not extend more than 3 mm above the top of the cover when tightened down. A 6-mm tapped hole and brass bonding screw shall be provided.

The opening of traffic pull boxes shall have the following dimensions:

Pull Box Type	Width (±25 mm)	Length (±25 mm)
No. 3 1/2(T)	270 mm	430 mm
No. 5(T)	330 mm	600 mm
No. 6(T)	430 mm	760 mm

Concrete placed around and under traffic pull boxes as shown on the plans shall contain a minimum of 325 kg of portland cement per cubic meter.

After the installation of traffic pull boxes, the steel covers shall be installed and kept bolted down during periods when work is not actively in progress at the pull box. When placing the steel cover for the final time, the cover and the Z-bar frame shall be cleaned of all debris and securely tightened down.

### 10-3.07 CONDUCTORS AND WIRING

Splices shall be insulated by "Method B" or, at the Contractor's option, splices of conductors shall be insulated with heat-shrink tubing of the appropriate size after thoroughly painting the spliced conductors with electrical insulating coating.

The minimum insulation thickness, at any point, for Type USE, RHH or RHW wire shall be 1.0 mm for conductor sizes No. 14 to No. 10, inclusive, and 1.3 mm for No. 8 to No. 2, inclusive. The minimum insulation thickness, at any point, for Type THW and TW wires shall be 0.69 mm for conductor sizes No. 14 to No. 10, inclusive, 1.02 mm for No. 8, and 1.37 mm for No. 6 to No. 2, inclusive.

In addition to the requirements for splices in detector circuits, the open end of cable jackets or tubing shall be sealed in a manner similar to the splicing requirements to prevent the entrance of water.

### TELEPHONE CABLE

The telephone cable (TC) shall consist of 6 pairs of No. 19 solid copper conductors. Conductors shall be twisted in pairs. Each conductor shall be insulated with a high molecular weight, heat stabilized, color coded polyethylene material. The insulation shall be 440 µm nominal.

Color code for TC cable shall be as follows:

1. White/Blue
2. White/Orange
3. White/Green
4. White/Brown
5. White/Gray
6. Red/Blue

The core shall be protected by a non-hygroscopic polyester film with a single longitudinally applied 120 µm thick corrugated copper shield (or 190 µm thick plastic coated aluminum shield). A moisture barrier of petrolatum-polyethylene compound shall be applied over the core tape and over and under the cable shield to fill all cable interstices.

The cable shall be provided with an outer jacket of extruded, black, high molecular weight, heat stabilized polyethylene material. The outer jacket shall have a thickness of 1.5 mm nominal. The outer diameter of the cable shall be 15.25 mm maximum.

Splices will not be allowed, except where shown on the plans.

All conductors shall be terminated inside the telephone demarcation cabinet and the controller cabinet as shown on the plans. All connections from the TBO terminal block to the 8-position connecting block shall be via a cable consisting of 2 pairs of No. 22 solid conductors and shall meet the same specifications as the TC cable.

**CAMERA MULTI-CONDUCTOR CABLE ASSEMBLY.--**The camera multi-conductor cable assembly shall be Belden #320060028-B cable or equivalent. The camera multi-conductor cable shall meet the following specifications:

The camera multi-conductor cable shall provide 25 conductors for control, video and power transmission.

The camera multi-conductor cable shall contain the following conductors as a minimum:

One twisted pair tinned copper conductors #22 AWG, 7 strand.

One twisted pair tinned copper conductors #16 AWG, 26 strand.

One twisted pair #22 AWG, 16 strand.

Three tinned copper conductors, #18 AWG, 16 strand.

Seven tinned copper conductors, #22 AWG, 7 strand, twisted with a tinned copper drain wire, #22 AWG, 7 strand.

Seven tinned copper conductors, #22 AWG, 7 strand, twisted with a 3 inch lay.

Two coaxial 75 Ohm cables, stranded core, with cellular polyethylene insulation.

The outer jacket is to an extruded Polyurethane Compound (B.F. Goodrich Compound 58300 or equivalent).

The conductors shall be cabled together with approximately two turns per foot.

The multi-conductor cable's fillers shall be a non-wicking nylon filament type.

**PAN AND TILT MULTI-CONDUCTOR CABLE ASSEMBLY.--**The Pan and Tilt multi-conductor cable assembly shall consist of twelve #18 AWG copper conductors stranded with 19 strand #30 AWG wire Belden 9774, or equivalent. Conductors shall be tinned copper, polyethylene insulated, twisted pairs. Each pair individually shielded with an aluminum-polyester shield and #20AWG stranded tinned copper drain wire.

**CABLE INSTALLATION.--**Cables shall be installed without damaging the conductors, connectors, pins sockets or insulation. The Cables shall not be kinked or bent tighter than the manufacturers' recommended bending radius.

Cables and connectors shall be waterproofed and configured in accordance with the equipment manufacturers' recommendations. Conductors and connectors shall adhere to the manufacturer's recommended pin configurations. Cables shall run continuously without splices.

All connectors and connector cable assemblies to the Weatherproof Outdoor Enclosure and Pan/Tilt shall be potted and weatherproofed with silicon-based, non-hardening sealant. A potting sleeve shall be used with all cables. All conductors and connectors shall adhere to the manufacturer's recommended pin configurations.

All cables and cable assemblies shall be labeled with permanent cable labels at each end. Each cable shall be uniquely identified and all cables and the associated label shall be included in the System Documentation.

### **10-3.08 SERVICE**

Continuous welding of exterior seams in service equipment enclosures is not required.

Type III service equipment enclosures shall be the aluminum type.

Circuit breakers shall be the cable-in/cable-out type, mounted on non-energized clips. All circuit breakers shall be mounted vertically with the up position of the handle being the "ON" position.

Each service shall be provided with up to 2 main circuit breakers which shall disconnect ungrounded service entrance conductors. Where the "Main" circuit breaker consists of 2 circuit breakers as shown on the plans or required in the special provisions, each of the circuit breakers shall have a minimum interrupting capacity of 10 000 A, rms.

Dead front panel or panels, and corresponding exterior door, shall be hinged on one side and shall be openable without the use of tools.

### **10-3.09 NUMBERING ELECTRICAL EQUIPMENT**

The Contractor shall place the numbers on the equipment as directed by the Engineer.

Reflective numbers shall be applied to a clean surface.

Where shown on the plans, 5-digit, self-adhesive equipment numbers shall be placed for all electroliers, soffit lighting, and sign lighting and service pedestals. On service pedestals, the numbers shall be placed on the front door. On electroliers, the numbers shall be placed as shown on Standard Plan ES-6A.

Where new numbers are to be placed on existing or relocated equipment, the existing numbers shall be removed.

Numbers for illuminated signs mounted on overcrossings or for soffit luminaires shall be placed on the nearest adjacent bent or abutment at approximately the same station as the sign or soffit luminaire. Where no bent or abutment exists near the sign or soffit luminaire, the number shall be placed on the underside of the structure adjacent to the sign or soffit luminaire. Arrangement of numbers shall be the same as those used for electroliers.

Adhesive numbers for all locations except wood poles shall be white reflective adhesive sheeting, 76mm in width, with 76mm, Series D letters and numbers. The letters and numbers may be screened on to the reflective sheeting or may be die cut and adhesively attached. The labels for each location may be individual characters applied or a continuous strip applied. Reflective sheeting, numbers and letters shall comply with the respective specifications in the Department of Transportation publication, "Specifications for Aluminum Reflective Sheeting Signs".

### **10-3.10 FLASHING BEACONS**

All incandescent lamps for flashing beacon units will be State-furnished as provided under "Materials" of these special provisions.

### **10-3.11 PREFORMED INDUCTIVE LOOPS.**

Preformed inductive loops shall be the type shown on the plans.

The loop shall be 1.8 m square unless otherwise shown. The loop shall consist of 4 turns of No. 16, or larger, wire with Type THWN or TFFN insulation.

The loop wires shall be encased in Size 10, minimum size, Schedule 40 or Schedule 80 PVC or polypropylene conduit. The conduit shall be sealed to prevent the entrance of water and the movement of wires within the conduit.

The loop wires from the preformed loop to the adjacent pull box shall be twisted together into a pair (at least 7 turns per meter) and encased in Schedule 40 or Schedule 80 PVC or polypropylene conduit between the preformed loop and the adjacent pull box or detector handhole. The lead-in conduit shall be sealed to prevent the entrance of water at the pull box or handhole end.

In new pavement, the preformed loops and lead-in conduits shall be placed in the base course, with top of conduit flush with top of base, and then covered with the asphalt concrete or portland cement concrete pavement. Preformed loops and lead-in conduits shall be protected from damage prior to and during pavement placement.

In new reinforced concrete structure decks the preformed loops shall be secured to the top of the uppermost layer of reinforcing steel using nylon wire ties. The loop shall be held parallel to the structure deck by using PVC or polypropylene spacers where necessary. Conduit for lead-in conductors shall be placed between the uppermost 2 layers of reinforcing steel.

In existing pavement, preformed loop installation shall conform to the following:

The preformed loops and lead-in conduits shall be placed in slots, 320 mm, minimum width, cut into the existing pavement. The top of the conduit shall be 50 mm, minimum, below the top of pavement.

Slots in asphalt concrete pavement shall be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.

Slots in asphalt concrete pavement shall be filled with asphaltic concrete sealant as follows:

After conductors are installed in the slots cut in the pavement, paint binder shall be applied to all vertical surfaces of slots in accordance with the provisions in Section 39-4.02, "Prime Coat and Paint Binder," of the Standard Specifications.

Temperature of sealant material during installation shall be above 21°C. Air temperature during installation shall be above 10°C. Sealant placed in the slots shall be compacted by use of an 200-mm diameter by 3 mm thick steel hand roller or other tool approved by the Engineer. Compacted sealant shall be flush with the pavement surface. Minimum conductor coverage shall be 25 mm. Excess sealant remaining after rolling shall not be reused. On completion of rolling, traffic will be permitted to travel over the sealant.

Slots in portland cement concrete pavement shall be filled with epoxy sealant or hot melt rubberized asphalt sealant.

### 10-3.12 EXTINGUISHABLE MESSAGE SIGN

Each extinguishable message sign shall be an internally illuminated weathertight and dusttight unit which will produce a clearly visible message only when internally illuminated and shall conform to these special provisions.

The general design of each sign shall be as shown on the plans. Minor details of construction shown are typical and may be modified subject to approval by the Engineer.

The Contractor shall submit 6 sets of shop drawings to the Engineer for review prior to performing any work on the signs.

**HOUSING.**--The housing shall be ruggedly constructed, shall be rigid, weathertight, dusttight, corrosion resistant and shall be made of durable materials.

Provisions shall be made for ease of maintenance of all components.

Sign panels and housing window shall be made of acrylic plastic which, including any painted portions, shall be highly resistant to crazing, staining, discoloration, creep and warping, and the long range deleterious effects of vehicle fumes, direct sunlight, heat (up to 90°C), water, oils, and aging.

The housing skin shall be made of Type 5052-H32 aluminum alloy sheet with clad finish. The housing reinforcing and miscellaneous parts shall be made of suitable gages and types of aluminum, except external fasteners, machine screw parts, lock washers, hinge pins, etc., which shall be made of Type 316 stainless steel.

Interior metal parts shall be made of suitable gages and types of plated steel or aluminum, except fasteners, machine screw parts, lock washers, and other miscellaneous parts shall be made of any corrosion resistant type of metal, other than aluminum.

The separable hinge for mounting the reflector shall be brass as shown on the plans or shall be stainless steel.

Gaskets shall be uniform and even textured and shall be highly resistant to stiffening and setting and the long range deleterious effects of vehicle fumes, direct sunlight, heat (up to 70°C), water, oils and aging.

Terminal strips shall be used for input, output and tie point connections and shall be of the molded phenolic, barrier type.

**BALLASTS, CONTROL RELAYS AND TERMINAL BLOCKS.**--Ballast inductors shall meet the requirements of ANSI Standard: C82.1, "Fluorescent Lamp Ballasts."

The inductors shall have the inductance noted on the plans ( $\pm 10$  percent), losses not exceeding 15 percent of lamp watts at rated current of inductor and a maximum current crest factor of 1.5 at rated current of inductor. The maximum temperature rise of the inductor coils shall be limited to 40°C above an ambient temperature of 40°C.

Heater transformers shall produce rated secondary voltage ( $\pm 10$  percent) at full load and at 1/3 load. The maximum temperature rise of the transformer coils shall not exceed 40°C above an ambient temperature of 40°C.

Inductors and transformers shall have cores made of a suitable grade of silicon steel lamination material and shall have thorough resin impregnation.

Each mounting chassis shall be fabricated of 3 mm, Type 5052-H32 aluminum alloy sheet. All units shall be mounted on the chassis with plated brass or steel hardware, except for lock washers which shall be beryllium copper, externally toothed.

Capacitors shall be rated 660 V, 60 Hz, AC, for operation down to -20°C with capacity as shown on the plans and shall be oil filled, paper type, hermetically sealed with solder lug terminals. Capacitance shall be within  $\pm 10$  percent of rating at 25°C. Each capacitor shall be capable of withstanding a current limited, DC, 15-second breakdown test at 25°C of 3000 V from each terminal to case. Minimum insulation leakage resistance from terminal to terminal, in megohms, shall be not less than 1500 divided by capacitance in microfarads.

Each magnetic control relay shall be of the heavy-duty, power type with 120-VAC coil and double-pole, doublethrow contacts with minimum rating of 2 A at 480 V, 60 Hz, AC. The coil shall consume not more than 10 voltamperes with sealed armature.

The relay coil shall be designed to provide reliable service under the following conditions:

Maximum operating voltage: 10 percent over rated volts.

Ambient temperature: 60°C.

The relay coil shall meet NEMA requirements for temperature rise and voltage breakdown.

Maximum dimensions of relay shall be: mounting base, 63.5 mm by 102 mm; overall height, 63.5 mm.

Fuseholders shall be the panel mounting type rated at 250 VAC, complete with a 10.3-mm diameter by 38-mm length, slow blowing, cartridge type fuse.

Surge limiting and ballast resistors shall be ceramic coated, 20-watt, wirewound units. Resistor leads shall have plastic insulation rated 600 VAC, for operation at 200°C.

All wiring connections from components shall be terminated on 2 molded phenolic, barrier type, terminal block assemblies rated at 15 A, 600 VAC. Terminal designations shall be marked as indicated on the plans.

**LAMP HOLDERS AND LAMPS.**--Lamp holders shall have silver plated contacts.

Lamps shall be of the extra-high output, rapid-start type with T-12 bulb of the length shown on the plans, cool-white color and plated contacts for operation up to 1500 mA.

**CONDUCTORS AND WIRING.**--Ballast and sign conductors shall be No. 16 stranded copper wire and shall be labeled by UL as 105°C appliance wiring material (AWM) for use at 600 V. Ballast conductors shall be secured with easily removable, spring cross straps (not clamped, cabled or served) on the underside of the chassis. Color coding and terminal markings shall be as shown on the plans.

Lead ends shall be fitted with spade lugs.

**LUG DISCONNECT.**--Each plug disconnect shall consist of molded nylon plug and receptacle housings containing plug pins and individual sockets designed to be crimped to conductors and snapped into the housings. Housings shall have integral, molded, polarizing and locking devices. Minimum UL electrical rating shall be 10 A, 600 VAC. Pins and sockets shall be tin plated phosphor bronze secured to conductors using a ratchet type precision crimping tool.

**TESTING.**--Tests shall verify that the following conditions exist:

- a. Transformer output voltage - 480 V  $\pm$ 10 percent.
- b. Sign input current (daytime level) - 4 A maximum.
- c. Lamp current each (daytime level) - 1.4 A  $\pm$ 15 percent (nighttime level) 30 mA  $\pm$ 15 percent.
- d. Cathode filament voltage - 3.6 V  $\pm$ 10 percent and shall be supplied from a steady (non-flashing) source.

**SIGN OPERATION.**--The sign shall operate as follows:

- a. During daytime, the lamps shall operate at full rated brightness.
- b. During nighttime, the lamps shall be dimmed to approximately one-thirty-fifth of daytime brightness.
- c. Starting and flashing shall be positive, without flickering, during daytime and nighttime levels.

### **10-3.13 MODEL 500 CHANGEABLE MESSAGE SIGN SYSTEM**

Model 500 changeable message sign (CMS) systems consist of a Model 500 changeable message sign, a Model 170 controller assembly in a completely wired Type 1 or similar cabinet, the required wiring and auxiliary equipment required to control the CMS, as shown on the plans and as specified in these special provisions.

The Model 500 changeable message signs, wiring harness, and controller assembly including controller unit and completely wired cabinet, but without anchor bolts, will be State-furnished as provided under "Materials" of these special provisions.

Model 500 changeable message sign system components shall conform to the requirements in "Specifications for Changeable Message Sign System," issued by the State of California, Department of Transportation, and to the addendums thereto current at the time of project advertising. Model 170 controller assemblies shall conform to the requirements in "Traffic Signal Control Equipment Specifications," issued by the State of California, Department of Transportation, and to the addendums thereto current at the time of project advertising.

The Contractor shall install the sign assembly on the sign structure, shall construct each controller cabinet foundation as shown on Standard Plan ES-4B for Model 332 and 334 cabinets (including furnishing and installing anchor bolts), shall install the controller cabinet on the foundation, and shall make the field wiring connections to the terminal blocks in the sign assembly and in the controller cabinet.

Field conductors No. 12 and smaller shall terminate with spade type terminals. Field conductors No. 10 and larger shall terminate in spade type or ring type terminals.

A listing of field conductor terminations, in each State-furnished changeable message sign and controller cabinet, will be furnished free of charge to the Contractor at the site of the work.

The location of the foundation for each controller cabinet will be determined by the Engineer.

State forces will maintain the sign assemblies. The Contractor's responsibility shall be limited to that provided for in Section 6-1.02, "State-Furnished Materials," of the Standard Specifications.

Overhead sign structures are provided for elsewhere in these special provisions.

#### **10-3.14 MODEL 170 BASED CABINETS**

The CCTV cabinets and the HAR cabinets shall conform to the provisions of the "Traffic Signal Control Equipment Specifications" (TSCES) issued by the State of California, Department of Transportation, and to all addendums thereto current at the time of project advertising.

Each Type 1 cabinet shall consist of a housing 1 (A or B), a mounting cage 1, a service panel #1, and a power distribution assembly, as described in Chapter 6 of the TSCES for Model 334 cabinets.

Police panels will not be required.

Prior to shipping to the project site, each CCTV, and HAR cabinets shall be submitted to the Department of Transportation Laboratory; 5900 Folsom Boulevard, Sacramento, CA 95819, for acceptance testing. The costs of transportation to and from the Laboratory shall be at the Contractor's expense.

Foundations for housing Type 1 shall conform to the details on Standard Plan ES-4B for Model 332 and 334 Cabinets. The Contractor shall notify the Engineer when each CCTV and HAR cabinet is ready for the functional test. The functional test will be conducted by State forces.

The following equipment shall be provided with each power distribution assembly:

- 2 - Duplex NEMA 5-20R controller receptacles
- 1 - 1 pole 30 amperes, 120 VAC Main circuit breaker
- 1 - 1 pole 15 amperes, 120 VAC circuit breaker
- 2 - 1 pole 20 amperes, 120 VAC circuit breakers

The Contractor shall furnish and install a rack mountable Power Strip Assembly (PSA) in each CCTV cabinet. The power strip assembly shall consist of 8 standard 117 VAC receptacles. The power strip assembly shall protect the equipment powered by the strip from power transients. Overvoltage protection shall be provided for the power strip assembly and shall contain as a minimum, a surge arrestor which shall reduce the effect of power line voltage transients.

The first sentence of Chapter 6, Section 3, Paragraph 6.3.4 of the TSCES is amended to read:

Six steel supporting angles extending from the front to the back rails shall be supplied to support the State-furnished fixed shelf and two Contractor furnished shelves. The shelf shall be attached to the top of two supporting angles with four screws. The front of the shelf shall abut the front member of the mounting cage. The shelves shall be arranged as shown on the plans.

#### **10-3.15 TESTING**

State-furnished equipment or existing facilities that fail during the functional test period will be replaced or repaired by the State or, if directed by the Engineer, by the Contractor, and such work will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Successfully completed functional testing prior to any failure of State-furnished equipment or an existing facility will be credited to the total required test period.

A final insulation resistance test shall be performed on the inductive loop detectors at the controller cabinet after said detectors have been installed in accordance with the details shown on the plans and the final splices have been made between the loop conductors and the lead-in cables.

#### **10-3.16 CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM**

The Closed Circuit Television (CCTV) System shall comply with all rules and regulations of the Federal Communications Commission and these special provisions.

Telecommunications equipment for interfacing the camera control receivers/drivers in the closed circuit television camera control cabinet to the Traffic Management Center (TMC) will be State furnished as provided under "State Furnished Materials" of these special provisions.

Cabinets for the CCTV system shall comply with the requirements for Model 170 Based Cabinets elsewhere in these special provisions.

The Closed Circuit Television (CCTV) System shall cover the installation and testing of the Closed Circuit Television System (Cameras, Camera Lenses, Weatherproof Outdoor Enclosures, Pan and Tilt Drive Units, Camera Control Receiver/Drivers), and associated cables. All items of the CCTV System shall be Contractor-furnished.

All elements of the CCTV System shall be tested by Caltrans Laboratories, 5900 Folsom Blvd., Sacramento, California. The Contractor shall be responsible for all deliveries.

Working drawings, material lists, and descriptive data specified in these special provisions shall be submitted for approval in accordance with the provisions to: TMC/TOS Electrical System Development & Operations, Traffic Management Branch, 1304 "O" St., Sacramento, CA 95814.

The CCTV System shall be installed as a complete and operational system.

If components normally operate from a DC power source, the required power supply shall be provided by the Contractor. All components of the CCTV system, except the cameras, shall have a minimum one year manufacturer's warranty for parts and labor. The cameras shall have a minimum of a two year manufacturer's warranty for parts and labor. All components of the CCTV system shall conform to the following shock and vibration specifications:

All components of the CCTV System shall be able to withstand a vibration of 5 to 30 Hz with 0.076 mm total excursion, from 60 to 1,000 Hz, with peak random vibrations of 5 gravities without damage or degradation. All components of the CCTV shall be able to withstand a shock of 15 gravities in any axis, under non-operating conditions.

Each section of equipment intended for the same purpose shall be the same make, model and manufacturer.

**COLOR CCTV ASSEMBLY.**--The Color CCTV Assembly shall consist of the Camera, Lens and Weatherproof Outdoor Enclosure and shall be furnished and installed as shown on the plans.

The Contractor shall provide Color CCTV Assemblies. The camera and lens shall be installed as one fully operational unit and shall properly fit in the weatherproof outdoor enclosure. Once in the enclosure, the camera and camera lens are assembled as a single unit. The Weatherproof Outdoor Enclosure is then to be sealed, pressurized and secured to the Pan and Tilt drive unit.

The CCTV assembly shall be installed such that the camera viewing coverage of the freeway is optimized as directed by the Engineer.

The Pan and Tilt Drive Unit shall position the camera under the control of the Camera Control Receiver/Driver.

The CCTV Assembly shall be fitted with a finished sun shroud to protect the equipment from heat, due to solar radiation. The sun shroud shall be strapped to the housing bindings such that the entire top portion of the CCTV Assembly is shielded from the sun. The sun shroud shall extend a minimum of 76 mm, in front of the housing's glass plate. The sun shroud shall be constructed of aluminum material and finished with white, heat-reflecting weatherproof paint.

The CCTV Assembly shall operate on 12 V AC/DC  $\pm 10\%$ , 60 Hz, powered from the Camera Control Receiver/Driver.

The Contractor shall provide 3 Color CCTV Assemblies one for each of the two CCTV locations, and one to be turned over to the Engineer.

**CAMERA.**--The Camera covers the furnishing, installation and testing of the CCTV Cameras.

The Contractor shall provide cameras. Closed Circuit Television (CCTV) cameras shall meet the following requirements:

The camera signal format shall be compatible with all applicable National Television Standards Committee (NTSC), be color, have 525 horizontal lines at 60 Hz, and provide thirty full frames per second.

The imaging system shall have a Charged Coupled Device (CCD) solid-state image sensor. The minimum number of picture elements shall be 768 (H) by 493 (V) pixels. The image area shall be 6.4 mm by 4.8 mm.

The video output shall be 1.0 volt peak-to-peak  $\pm 3.0$  dB (75-ohm balanced).

The minimum scene illumination necessary for full video output shall be 13 lux and a minimum of 1.1 lux for 80% video measured at the faceplate.

The camera resolution shall be a minimum of 460 horizontal television lines and a minimum of 350 vertical television lines when measured from the composite video output.

The signal-to-noise ratio with Automatic Gain Control (AGC) off shall be equal or greater than 48 dB, Committee Consultation International Radio (CCIR) weighting.

Gamma shall be 0.5.

The imaging system shall be designed to minimize the effect of blooming and smearing of high intensity light sources under night time viewing conditions.

The camera shall be equipped with a standard "C" type lens mount. The camera shall be supplied with accessories for the lens mount cap, mount adapter, and the connector for the auto iris lens.

The camera shall operate and meet all of the operational requirements of these specifications within a temperature range of -20 to +50° C and within a range of 0 to 95 percent relative humidity.

The camera dimensions shall not exceed 218 mm x 69 mm. The weight of the camera shall not exceed

Camera tests shall be conducted in the factory on each unit supplied. These tests shall be in accordance with the manufacturer's standard factory test procedures and the manufacturer shall certify that each camera has passed the factory test procedure. The Contractor shall provide a copy of the standard factory testing and quality assurance procedures to the Engineer.

The camera shall have the capability of superimposing a camera identification on the video display. The identification shall be capable of two lines of twenty four characters. The characters shall be white with a black border. The camera identification shall be input via a DB25 RS-422 connector into the camera housing connector and be



programmable from a dumb computer terminal and a computer. The character generator shall also superimpose a message indicating that the camera pressure is low, if the pressure in the enclosure drops to 13.79 kPa and below.

**CAMERA LENS.--**The Camera Lens covers the furnishing, installation and testing of the Camera Lenses.

The Contractor shall provide camera lenses. The camera lenses shall be motorized lenses with automatic iris and manual override. The iris shall be controlled directly through the camera in automatic mode and from the Camera Control Receiver/Driver in manual mode. The lens shall incorporate an intra-spot neutral density filter.

The lens shall be fully compatible with the camera provided. The camera lens shall be controlled from the Remote Camera Control keypads at the Traffic Management Center (TMC) via the following path: Remote Camera Control, Master Camera Control, VME Computer System, NT1/TA, ISDN phone service, NT1/TA, and Camera Control Receiver/Driver (CCR), or as directed by the Engineer.

Lenses shall meet all of the following requirements:

The camera lens shall be a 12.7 mm format lens with an automatic iris. The automatic iris shall provide continuous aperture adjustments of the lens as determined by the amount of light reaching the camera imager.

The camera lens shall provide positioning, to be controlled from the Camera Control Receiver/Driver units and the Camera Control Panels.

The lens shall have a standard "C" type mount, 12.7 mm format.

The focal length of the lens shall be 8 mm to 80 mm providing a 10:1 power zoom.

The maximum aperture of the lens shall be no less than f1.2.

The lens shall operate and meet all of the operational requirements of these specifications within the temperature range of -20 to +50° C and within a range of 0 to 95 percent relative humidity.

**WEATHERPROOF OUTDOOR ENCLOSURE.--**The Weatherproof Outdoor Enclosure covers the furnishing, installation and testing of the Weatherproof Outdoor Enclosure.

The Contractor shall provide Weatherproof Outdoor Enclosures. The Contractor shall install the Weatherproof Outdoor Enclosure to the Pan and Tilt unit following the manufacturer's recommendations.

The Weatherproof Outdoor Enclosure shall protect the camera and lens from the outdoor environment. The enclosure shall be of a suitable size to house the CCTV camera and zoom lens, and meet the following requirements:

The Weatherproof Outdoor Enclosure shall be the sealed and pressurized tube type. The enclosure shall be factory sealed with dry nitrogen to 34.5 kPa  $\pm$  7 kPa.

A standard Schrader valve shall be located on the back plane of the environmental enclosure for pressurizing and purging. A decal shall be affixed permanently to the rear housing plate stating that the unit is pressurized and that safety precautions must be observed.

A pressure relief valve, preset to 138 kPa  $\pm$  34.5 kPa, shall be located on the back plate of the environmental enclosure.

A safety pressure release bolt shall be incorporated such that the enclosure may not be opened without first releasing the internal pressure.

The enclosure shall be fully compatible with the camera equipped with the specified lens as well as the Pan and Tilt drive unit. Provisions shall be made to secure the CCTV camera and lens to the base of the weatherproof environmental enclosure. The camera and lens shall be mounted in such a way as to ensure that the field of view is not obstructed by the enclosure.

Each housing shall have one package of desiccant placed in the enclosure.

The Weatherproof Outdoor Enclosure shall be constructed of aluminum material and finished with white, heat-reflecting weatherproof paint.

The camera connector for the Weatherproof Outdoor Enclosure shall be mounted on the rear plate and sealed to the plate with an O-ring.

A Bendex 90 degrees endbell or equivalent shall connect to the PT-type connector of the Weatherproof Outdoor Enclosure to relieve strain from a bending multi-conductor cable.

The camera multi-conductor cable shall have an MS-type connector to the Camera Control Receiver/Driver to provide interconnections for all camera drive signals, camera video output and input camera power. The Bendex 90 degrees endbell or equivalent with a PT-type connector of the camera cable shall terminate to the CCTV Assembly.

The camera and pan/tilt multi-conductor cables shall terminate as shown on the plans.

The enclosure dimensions shall not exceed 115 mm in diameter and 510 mm in length. The weight of the complete CCTV Assembly with accessories shall not exceed 5.45 kg. The enclosure viewing window shall be a plate of glass a minimum of 5.7 mm thick.

The enclosure shall operate and meet all of the operational requirements of these specifications within a temperature range of -20 to +50° C and within a range of 0 to 100 percent relative humidity.

The Contractor shall provide all necessary cables, brackets, connectors, potting sleeves, potting materials, NEMA 3R enclosures, and auxiliary materials required to connect the Lens and Camera to the Weatherproof Outdoor Enclosure and Weatherproof Outdoor Enclosure to the Camera Control Receiver/Driver.

**CAMERA POLES**--Camera poles shall conform to the provisions in Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

**PAN AND TILT UNIT**-- The Pan and Tilt units covers the furnishing, installation and testing of the Pan and Tilt units. The Contractor shall provide Pan and Tilt units.

The Pan and Tilt unit shall be compatible with the Camera Control Receiver/Drivers (CCR), mounts, Weatherproof Environmental Enclosures and the camera and lens assemblies provided under this contract.

The Contractor shall install the Pan and Tilt unit to the mounting plate of the sign structure, or the standard, using high strength bolts, lockwashers and nuts.

The Pan and Tilt unit shall be a medium duty Pan and Tilt.

After installation, the Contractor shall test the Pan and Tilt unit for correct operation from the cabinet location.

The Pan and Tilt shall be controlled from the CCTV Controller Cabinet via the rackmount Camera Control Receiver/Driver (CCR), and from the Remote Camera Control keypads at the Traffic Management Center (TMC), or as directed by the Engineer.

The Pan and Tilt unit shall meet the following specifications:

The travel angle of the pan/tilt drive unit shall be 350 degrees minimum in the horizontal plane and  $\pm 90$  degrees in the vertical plane. Position of camera stops shall be approved by the Engineer.

The Pan and Tilt unit shall provide positional feedback through an internal potentiometer to accommodate preset positions, controlled from the TOC and Camera Control Receiver/Driver.

The Pan and Tilt unit shall pan at a nominal speed of 5 to 10 degrees per second, and a nominal tilt of 2 to 4 degrees per second.

The Pan and Tilt unit shall have instantaneous reverse motor action. Dynamic braking shall also be incorporated to prevent drift.

The Pan and Tilt housing unit shall be constructed of aluminum casting with an enamel finish. Heavy duty roller bearings shall be used on all rotating surfaces. All rotor gears shall be made from hardened steel and low temperature lubricant shall be used. Gasket seals shall be incorporated to ensure all-weather protection. All internal parts shall be corrosion protected.

Provision shall be made for mounting the weatherproof outdoor enclosure with the camera assembly to the Pan and Tilt unit at the correct pivot point.

The Pan and Tilt unit shall be capable of supporting a maximum load of 18.1 kg at 127 mm from tilt table surface to the center of gravity.

The Pan and Tilt unit shall be of the adjustable worm gear final drive type, to prevent drift and minimize backlash.

The Pan and Tilt unit shall be powered and controlled from the Camera Control Receiver/Driver via a multi-conductor cable. The multi-conductor cable shall terminate into the Pan and Tilt unit via a CPC-type connector and terminate into the Camera Control Receiver/Driver via an MS-type connector. The multi-conductor cable shall provide control signals for the Pan and Tilt and provide power.

The Pan and Tilt unit shall be fully load rated to accept the CCTV camera, lens, and weatherproof enclosure under wind load conditions of 144 kph and shall be rated for full operation within a temperature range of  $-23$  to  $60^{\circ}$  C and within a range of 0 to 100 percent relative humidity.

The dimensions of the Pan and Tilt unit shall not exceed 280 mm(W) x 305 mm(H) x 152 mm(L). The weight of the Pan and Tilt unit shall not exceed 27.22 kg.

The Pan and Tilt unit shall operate on 115 VAC  $\pm 10\%$ , 60 Hz, powered from the Camera Control Receiver/Driver.

All conductors and connectors shall adhere to the manufacturer's recommended pin configurations.

The Contractor shall provide all necessary cables, brackets, connectors, potting sleeves, potting materials, and auxiliary materials required to connect the Pan and Tilt unit to the Camera Control Receiver/Driver.

The Contractor shall provide four Pan and Tilt Units, one for each of the two CCTV locations, and two to be turned over to the Engineer.

**CAMERA CONTROL RECEIVER/DRIVER**--The Camera Control Receiver/Driver (CCR) covers the furnishing, installation and testing of the Camera Control Receiver/Driver units and control panels.

The Contractor shall provide Camera Control Receiver/Drivers.

Equipment supplied by the Contractor shall consist of a Camera Control Receiver/Driver and any auxiliary equipment and cabling required to interface with the Pan and Tilt Drive Unit, Camera, Camera Lens, Environmental Enclosure, and the State furnished telecommunications equipment.

The CCR shall be controlled from the Remote Camera Control keypads at the Traffic Management Center (TMC) and from the control panel on the CCR.

After installation and testing of each of the Pan and Tilt units and of the Camera Control Receiver/Driver, the Contractor shall confirm operation of each Pan and Tilt unit using the Camera Control Receiver Driver and appropriate test equipment or system equipment at each field location.

The CCR shall be rack-mounted in the field cabinets at CCTV System Locations shown on the plans.

CCTV Systems shall provide camera and pan and tilt control switches on the CCR.

The CCR shall meet the following specifications:

The CCR shall be compatible with the CCTV Assembly, Pan and Tilt unit and State furnished telecommunications equipment.

The lens driver circuit shall provide power at the appropriate voltages for zoom, focus, and iris camera control.

The Pan and Tilt driver board shall provide power at the appropriate voltages to control the left/right pan and up/down tilt.

The CCR shall be capable of storing a minimum of ten preset camera positions in a battery backed, non-volatile Random Access Memory (RAM).

The CCR shall be provided with two multi-conductor cable assemblies. The camera multi-conductor cable assembly shall have an MS-style connector to the CCR to provide all interconnections for the camera lens drive signals, camera video output and input camera power. A Bendex 90 degrees endbell or equivalent with a PT-type connector of the camera multi-conductor cable's shall terminate to the CCTV Assembly. The Pan and Tilt multi-conductor cable assembly shall have an MS-type connector to the CCR to provide all interconnections for all Pan and Tilt drive signals, positional feedback and input Pan and Tilt power. The Pan and Tilt multi-conductor cable shall terminate to the Pan and Tilt with a CPC-type connector.

The device drivers of the Camera Control Receiver/driver shall initially operate using the parameters of 1200, 8 data bits, 1 stop bit and no parity bit.

The CCR and associated equipment shall fully operate and meet all of the manufacturer's performance requirements over a temperature range of -40° F to +140° F (-40 to 60° C) and within a range of 0 to 100% relative humidity.

The input voltage to the Camera Control Receiver/Driver shall be 117 VAC  $\pm$  10%, 60 Hz.

All connectors and cable assemblies to the CCR shall be potted with a silicon-based, non-hardening sealant, and weatherproofed. A potting sleeve shall be used with all cables. All conductors and connectors shall adhere to the manufacturer's recommended pin configurations.

The Contractor shall provide all necessary cables, surge protectors, power supplies, potting sleeves, potting materials, and auxiliary materials required to connect the CCR to the Pan and Tilt unit and Weatherproof Outdoor Enclosure.

The Contractor shall provide four Camera Control Receiver/Driver units, one for each of the two CCTV locations, and two to be turned over to the Engineer.

The CCR shall communicate with the TMC using equipment that will be provided by the Engineer and installed by the Contractor in the 334 cabinet and the TDC, or as directed by the Engineer.

## **MAINTENANCE PROGRAM**

After the successful completion of the Final System Test, the Contractor shall provide a 120 working day maintenance program for the system installed under the project for any and all equipment which the Contractor furnishes and installs. Any working day during which the Contractor fails to restore the system to use within 24 hours of a failure, other than due to power or telephone service failure, will extend the maintenance program by one working day. The Contractor's responsibility for maintenance of the system terminates at the end of the 120 working day maintenance program.

The Contractor shall furnish the State with a list of names and telephone numbers where persons designated by the Contractor can be reached to give notification of any alleged defects for which the Contractor has repair or replacement responsibility.

The Contractor shall assume full responsibility to maintain the equipment supplied, and every part thereof, in complete repair for the period of the maintenance program and make good in a permanent manner, satisfactory to the Engineer, and all damages or injury to equipment, which, in the opinion of the Engineer, results from faulty workmanship or materials both during construction and during the maintenance program period.

Should the Contractor fail to respond to the Engineer's request in this respect, within twelve hours of the Engineer's notification to the Contractor, then the Engineer will cause the defective equipment to be removed and returned to the Contractor and shall be entitled to deduct freight and labor charges from any monies due or to become due to the Contractor.

Alternatively, the Engineer may have defective part or parts repaired or replaced at the sole expense of the Contractor. The Engineer's decision shall be final as to the nature and cause of such defects and the necessity and means of remedying them.

Preventative maintenance shall be provided on a scheduled basis according to a schedule recommended by the Contractor and approved by the Engineer. This maintenance shall not interfere unreasonably with the normal use of the equipment by the State and shall be consistent with the equipment manufacturers' recommendations.

When the Contractor desires access to the equipment, he shall first notify the Engineer. The Engineer will then provide the Contractor with the times acceptable to the Engineer as to when access can be obtained. The Contractor shall be responsible for all traffic control during the maintenance operations subject to the same requirements noted elsewhere herein.

### **TRAINING**

Training, if required, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. A decision will be made by the State as to whether or not training will be required.

### **TESTING AND DOCUMENTATION**

The Contractor shall conduct tests of the individual components of the CCTV system in accordance with specifications and these special provisions.

Prior to conducting any tests the Contractor shall provide the Engineer detailed test procedures for review and approval.

Documentation of all test results shall be provided to the Engineer for review and approval. System Documentation shall incorporate test results for ongoing maintenance and performance measurements.

**FACTORY TEST.--**All CCTV equipment furnished by the Contractor shall be tested and subjected to a nominal 48-hour burn-in period at the factory. The factory tests shall be in accordance with equipment manufacturer's standard procedures and quality assurance program.

The Contractor shall provide documentation certifying and showing that each item supplied has passed factory inspection, burn-in and testing.

**POST INSTALLATION TESTING--**The Contractor shall test each item after installation to ensure that the equipment has been installed without damage and operates correctly.

**CCTV SYSTEM LOCATION TESTS--**The Contractor, after installation of each Color CCTV Assembly on the Pan and Tilt Drive Unit, shall verify the correct operation of the Camera, Lens, Pan and Tilt drive unit, and the Weatherproof Outdoor Enclosure accessories from the cabinet location. These tests shall include:

1. Viewing video images as the lens focal lengths and apertures of the Lens is varied. The Contractor shall verify that the Camera is focused after each change.
2. Verifying the correct operation of the auto iris, power zoom and imager protection features.
3. Verifying the correct operation of the Pan and Tilt unit. The Pan and Tilt stops shall be such that the camera viewing coverage of the freeway is optimized as directed by the Engineer.

**TMC LOCATION TESTS--**The Engineer, after installation of the Video and Camera Control System, shall verify the correct operation of the CCTV Assemblies, Pan and Tilt drive units, weatherproof housing accessories from the TMC location. These tests shall be conducted at the TMC using test panels and equipment furnished by the Engineer. These tests shall include:

1. Viewing video images as the lens focal lengths and apertures of the lens is varied from the Master Camera Control Panel and the Remote Camera Control Panel. The Contractor shall verify that the camera is focused after each change.
2. Verifying the correct operation of the auto iris, power zoom and imager protection features from the Master Camera Control Panel and the Remote Camera Control Panel.
3. Verifying the correct operation of the Pan and Tilt unit from the Master Camera Control Panel and the Remote Camera Control Panel.
4. Verifying the correct operation of the Preset Panel. The Master Camera Control Panel and the Remote Camera Control Panel shall position the corresponding CCTV Assembly at the preset position.
5. Verifying the correct operation of the Video Switch Matrix(VSM). The VSM shall switch any of the chosen composite video input signals to any one of the chosen composite video outputs without blocking other users.

The Contractor shall have a representative present during all phases of testing, who is capable of troubleshooting Contractor installed equipment. The representative shall troubleshoot Contractor installed equipment as the need arises. All of the work described herein shall be considered paid as part of the CCTV installation.

**FINAL SYSTEM TESTS--**In the presence of the Engineer, the Contractor shall conduct a final test of the CCTV System to verify the system is complete and fully operational. The Contractor shall conduct end to end performance tests on the CCTV system. These tests shall confirm the functional operation of all elements of the system, including both State and Contractor furnished items, and shall include measurements of the system performance.

Each camera shall be tested to measure the video signal received using a NTSC waveform monitor. The testing shall confirm video levels and signal to noise ratio specification compliance for daytime and nighttime operation at each of the CCTV System Locations and the TMC Location. The Pan and Tilt shall be functionally tested over 350 degrees in the horizontal plane and  $\pm 90$  degrees in the vertical plane. Functional testing shall also confirm specification compliance for the lens operation, the auto and manual iris control, and the Camera Control Receiver/Drivers

**DOCUMENTATION--**The Contractor shall provide documentation containing complete details of how the final system is actually configured, including theory of operation together with complete operating and maintenance information. All data shall be submitted on 22 inch by 36 inch sheets or on 8 1/2 inch by 11 inch sheets in loose leaf bound manuals, as appropriate.

Each submission shall be prominently identified as Caltrans District 3 CCTV, the subject of the data, date, name and address of the Contractor, and shall further indicate the specific individual (mailing address, telephone number and fax number) to contact relative to matters in the submission. If more than one volume is used, each should be so identified.

Complete documentation shall be delivered at least 15 calendar days prior, and approved at least 7 days prior (unless otherwise approved by the Engineer), to conducting any training sessions and/or acceptance tests.

The general requirements for documentation of major system components are as follows:

- (a) General description of the system
- (b) Overview of operation
- (c) System and subsystem block diagrams
- (d) Functional data flow diagrams
- (e) Physical organization of system
- (f) Overall system specifications
- (g) Manufacturer's handbooks for equipment

Detailed description shall be provided on the following:

- (a) Operating procedures including start-up, shut-down, restart and other recommended procedures to ensure satisfactory performance of the system.
- (b) Video and communications equipment including layouts, cabling, wiring, controllers, modems, Schematics, parts lists, etc.

Documentation shall be grouped into two main categories:

- (1) System Operations Manual, with ten copies supplied, shall include, but not be limited to, the following items:

- (a) As-built documentation
- (b) System test results
- (c) Equipment model/serial numbers and options
- (d) System schematic
- (e) Recommended routine maintenance
- (f) Recommended maintenance program
- (g) System diagnostic procedures
- (h) Results of all system tests performed

(2) Individual Operation and Maintenance Manuals shall be provided for each piece of equipment (1 per each individual unit supplied). The Operation and Maintenance Manual shall include, but need not be limited to, the following items:

- (a) Specifications
- (b) Design characteristics

- (c) General operation theory
- (d) Function for all controls
- (e) Trouble shooting procedure (diagnostic routine)
- (f) Block circuit diagram
- (g) Geographical layout of components
- (h) Schematic diagrams
- (i) List of replaceable component parts with stock numbers

The State shall have the right to reproduce copies of all documentation provided by the Contractor hereunder, provided that such reproduction is solely for the use of the State or its designated representatives.

Throughout the Maintenance Program the Contractor shall correct all errors in documentation. Such corrections shall be made within fifteen calendar days after discovery of error and shall be at no cost to the State.

### **10-3.17 HIGHWAY ADVISORY RADIO SYSTEM**

#### **DESCRIPTION**

This work shall consist of furnishing and installing a highway advisory radio (HAR) system, as shown on the plans, and conforming to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

The highway advisory radio (HAR) system shall consist of AM broadcast band radio equipment for a fixed location.

The HAR system shall include one AM transmitter, coupler, audio processor, telephone line interface, solid-state recorder/player, one antenna, fiberglass pole, cabinet, grounding system, transient lightning suppression, battery back-up/charging systems, external digital recorder/player microphone, (or broadcast quality headset with noise canceling microphone) and control speaker phone.

Fiberglass Pole for the HAR shall comply with the requirements for FIBERGLASS HIGHWAY ADVISORY (HAR) POLE elsewhere in these special provisions.

Cabinet for the HAR system shall comply with the requirements for Model 170 Based Cabinets elsewhere in these special provisions.

The outside of each equipment packing container shall be marked with the Caltrans contract number and the make, model number, serial number and installed operating frequencies of the unit within.

Test methods followed by the State for evaluation of supplied equipment will follow EIA recommendations where applicable.

Prototype equipment will not be acceptable. Only equipment previously marketed and sold for at least 6 months prior to the advertising date will be acceptable.

Any semiconductor devices or components utilized in the radio equipment which are not available from a minimum of two manufacturers shall have five such devices or components provided for each device utilized in the radio equipment.

All manuals, warranty forms, and license forms shall be submitted with the unit(s) for acceptance.

All equipment shall be warranted against defects and any failures which may occur through normal use for one year from the date the equipment is placed in service.

Proper contact protection shall be placed at all high voltage connections to prevent accidental contact with operators and operator's tools and equipment.

The HAR system may consist of equipment from multiple manufacturers but shall be integrated to be fully functional.

The HAR system shall be designed to operate in conformance with CFR Title 47, Section 90.242 of the FCC rules and regulations.

Enclosures and all radio, electrical, and mechanical equipment shall be designed to be card rack or shelf mounted inside a Caltrans standard Model 332/334 controller cabinet enclosure as described in Section 86-3.11, "Model 170 and Model 2070 controller Assemblies," of the Standard Specifications. Card rack mountable equipment shall be provided with slotted mounting holes and shall be compatible with an EIA-310B rack.

The equipment shall be designed and installed in such a way to be easily accessible for maintenance.

#### **TRANSMITTERS**

The transmitters shall be the type certified and accepted by the FCC for travelers information stations (TIS) service, and shall operate in a range from 530 kHz to 1700 kHz.

Each transmitter shall have the capability of remote and local control. The ability to broadcast live messages from the transmitter site and the ability to record and broadcast from the Transportation Management Center (TMC) shall be provided.

Adjustment of RF power output shall be made by using an easily accessible control and shall be continuously adjustable over the transmitter output power range specified herein.

Built-in, switchable meters shall indicate relative percentage of modulation and forward/reflected RF output power levels.

A provision for automatic station identification using stored, digitized audio shall be provided every 30 minutes while transmitting.

Operating temperature range shall be from -30°C to 60°C. Operating humidity range shall be from 20 percent relative at 30°C to 95 percent relative at 50°C.

The HAR shall deliver a 2 millivolt/meter signal, minimum, at a distance of 1.5 km (0.93 miles) from the station with a maximum transmitter output of 10 watts.

The transmitter shall withstand an overload mismatched output (including an open or short circuit) for a period of 5 minutes at 10 watts output without overheating or component failure. The transmitter shall automatically resume normal operation when the mismatched output load is removed.

The transmitter RF power output level shall be rated at 30 watts, maximum. The transmitter output level shall be adjusted from a minimum of 2 watts to no more than 10 watts. A warning label shall be securely attached to the transmitter next to the adjustment output control and shall read as follows, "DO NOT EXCEED 10 WATTS".

Transmitter	
RF power output	Adjustable to 10 watts
Type of emission	Amplitude modulation (A3)
Frequency range	500 kHz to 1.7 MHz
Frequency stability	±0.002% (0° to 35°C)
Carrier shift	2% maximum
Harmonic attenuation	45 dB or better
Noise	-60 dB below 100% modulation
Audio input	600 balanced
(for 100% modulation)	-30 dBm minimum
Frequency response	20 Hz to 15kHz ±1.0 dB maximum
Audio distortion	Less than 2% @ 99% modulation
Modulation monitoring	100% peak flasher Built-in envelope detector
Modulation limiting	Built-in 100% peak modulation limiter 20 dB gain reduction: defeatable
Power consumption	100 watts at 115 VAC

The transmitter shall be equipped with a high stability oven controlled crystal oscillator. The oscillator shall be of the stress compensated (SC) cut crystal type and meet the following specifications:

Oscillator	
Temperature stability:	$\pm 5 \times 10^{-8}$ over $-30^{\circ}/+70^{\circ}$ C.
Aging:	$5 \times 10^{-10}$ /day, $1 \times 10^{-7}$ /year
Frequency vs. supply:	$2 \times 10^{-9}$ /percent
Short-term: (Allan Variance)	$1 \times 10^{-11}$ /second
Warm-up @ $25^{\circ}$ C.: (Relative to 2 hrs. after turn-on following 24 off)	$1 \times 10^{-7}$ in 7 minutes $3 \times 10^{-8}$ in 10 minutes
Output:	0.5 V <sub>rms</sub> into 50 (7 dBm)
Harmonics/subs:	-20 dBc (for sine out)
ssb Noise/Hz: (Typical, degrades 6 dB per octave above 12 MHz)	-115 dBc at 10 Hz -148 dBc at 10 kHz
Supply:	12 Vdc $\pm$ 5%
Input power:	4 watts at turn-on 2 watts stabilized at $25^{\circ}$ C.
Frequency Adjust: (Mechanical)	Range for 10 years aging, settable to $5 \times 10^{-9}$ nominal
Electrical tuning:	Not included
Base:	Pins for PC Mounting

**Transmitter Station.**--The transmitter station shall include the amplitude modulation (AM) transmitter and antenna system, digital recorder system, lightning protection, controls, dual tone multi-frequency (DTMF) telephone handset, back-up system, conduit, wiring and other hardware required for proper operation. The transmitter station shall be housed in a Model 332/334 cabinet enclosure.

The operating frequency of the transmitter shall be 1610 kHz as shown on the plans.

#### POWER/VOLTAGE STANDING WAVE RATIO (VSWR) METER

One radio frequency (RF) power/VSWR meter shall be included with the transmitter. The power/VSWR meter shall be placed between the antenna and the RF output of the transmitter coupler. The power/VSWR meter shall have the following features and requirements:

Meter.--Displays forward RF power, reflected RF power and SWR. Uppermost scale is for high (H) and low (L) power SWR reading. Low power SWR scale is for RF power below 30 W. High power SWR scale is for RF power over 30 W. Second and third scales are for RF power measurement which are 30 W, 300 W and 3 kW full scales.

Range Switch.--Selects full scale RF power reading between 30 W, 300 W and 3 kW.

Function Switch.--Selects measurement function between RF power and SWR.

Calibration Knob.--Sets RF power to full scale reading depending on transmitting RF power to measure SWR. Readings increase as the knob is being turned clockwise in transmission.

Power Direction Switch.--Selects RF power measurement between forward RF power and reflected RF power.

Meter Zero Adjustment Screw.--Adjusts the meter indicator to zero position with regular screwdriver if the indicator is far from zero position when the unit is not in use.

Transceiver.--RF power input from a radio equipment which is to be connected by 50 coaxial cable with UHF connector.

Antenna.--RF power output to an antenna or a dummy load which is to be connected by 50 coaxial cable with UHF connector.

13.8 VDC.--DC power source for meter illumination and LED display. Acceptable DC voltage range is from 11 VDC to 15 VDC. Connect red line for positive and black line for negative polarities. This power source is not essential for measuring purpose.



## **COUPLER UNIT**

The coupling unit shall:

- a) isolate the transmitter from high voltage through the use of high-pass capacitors and fuses.
- b) compensate for antenna system impedance mismatch through the use of multi-tap toroidal transformers.
- c) compensate for antenna stray reactance through the use of a decade system of capacitor combinations.
- d) include an internal VSWR meter and include controls for correcting load impedance and reactance.

## **HAR POWER AND BACK-UP EQUIPMENT**

Equipment necessary for operation and backup of the HAR shall be included as part of the system and shall conform to the following.

**Primary Power Input Provisions.**--Operation shall be from  $117 \pm 10$  percent VAC,  $60 \pm 3$  Hz single phase, at a power input not to exceed 100 watts, continuous.

The primary input power shall be controlled by a circuit breaker mounted on the front panel labeled "AC POWER".

An AC power light indicator shall be provided on the front panel.

**Interface Unit.**--The highway advisory radio system shall be supplied with an interface unit containing all system power control including chargers, isolation relays, metering, switches, fuse indicators and audio/power arrestors. The interface unit shall plug into 120 VAC power in the cabinet via a standard 120 VAC cord and plug. Barrier strips on the rear provide for telephone line input and output, battery charge/discharge and 24 V power distribution to components. The outside of the unit shall be marked "HAR INTERFACE".

**Main Power Back-up.**--In the event of AC power loss, the HAR system shall automatically switch to a battery back-up system and continue to operate without degradation of performance for a period of not less than 12 hours.

The battery back-up system shall utilize a battery charger and gel cell batteries. The battery back-up system shall maintain the batteries without overcharging. The batteries shall not emit any corrosive, toxic or explosive gasses.

The HAR system shall resume normal operation after AC power has been restored.

Indicator lights shall be provided to show when the unit is operating on AC power, or when it is operating on battery back-up. A voltmeter shall show the condition of the battery back-up system.

A front panel switch labeled "DC POWER" shall activate DC operation for the HAR system.

Fuse protection shall be provided on the battery charger and on the front panel for DC load.

The battery charger shall be designed for floating service and have an adjustable output voltage. The battery charger shall be the complete shut off type (fully automatic) and shall bring completely discharged batteries to a fully charged condition within 12 hours. The battery charger shall be designed to operate in unventilated area.

When the HAR is operating on battery back-up, the system shall automatically disconnect the HAR, to protect the batteries from damage caused by too deep a discharge. The disconnect threshold shall be adjustable over the range of either 20.0 to 24.0 VDC for a 24 volt system or 10 to 12 VDC for a 12 volt system. The batteries shall not discharge to less than 10 volts DC for a 12-volt system, or 20 volts DC for a 24-volt system, when supplying 4.0 amperes for a period of 30 hours at 30° C. They shall be organized as a group of two 12 volt batteries and mounted on a wooden frame at the bottom of the controller cabinet enclosure.

The batteries shall be easily accessible and removable from the cabinet for service or replacement using connectors that do not require the use of hand tools. If 2 connectors are identical, and used for different purposes, they shall be clearly marked or polarized differently to ensure proper installation after repair or replacement of component parts. When the battery back-up system is disconnected from the cabinet, the station shall be capable of continued operation solely on AC power without having to connect, jump, or bypass any other device. Only relay, contact, and switch type devices shall be used to make a clean procedure of removal.

## **HAR OPERATION CONTROL EQUIPMENT**

Equipment necessary for local and remote control of the HAR operations shall be included as part of the system and shall comply with the following.

**Local Control Facilities.**--Local operator control of all essential features of the highway advisory radio station shall be accomplished either by the use of a standard dual tone multi-frequency (DTMF) telephone or by necessary discrete front panel controls.

**Remote Control Facilities.**--A telephone line interface shall be provided so that the HAR may be connected to and controlled through a voice-grade dial-up telephone line, leased telephone line, or cellular telephone line with appropriate interface. The telephone line interface shall have a standard RJ-11 connector.

The HAR shall be equipped with a telephone line interface so that it will be possible to access, monitor and control the message being transmitted. The audio for the monitor function shall be obtained by demodulating the transmitter audio.

**Cellular Telephone Interface Equipment.**--The cellular telephone interface shall be a Telular Model CPTe-1 Series M, or equal.

The cellular telephone interface shall provide standard wireline service (via an RJ11C female connector) directly to a cellular transceiver and permit normal usage of the attached telephone equipment.

The cellular telephone interface shall consist of a cellular transceiver, universal AC/DC power supply, self contained battery back-up, cellular to wireline interface board, locking cabinet and fixed mount cellular antenna with attached cable and connector.

The cellular telephone interface shall operate on 117 VAC  $\pm 10$  percent, 60 Hz  $\pm 4$  Hz. In the event of power failure, the interface shall automatically transfer to DC power to operate from the battery back-up system.

The cellular transceiver shall have 832 channel capability and have a power output of 3 watts.

Connections to the cellular telephone interface shall be: (2)-RJ-11C connector, AC input, antenna connector (TNC).

The cellular to wireline interface board's tip and ring electrical specifications provided by the interface board shall be as follows:

Open circuit:	- 50 VDC $\pm 10\%$
Source off hook:	- 30 VDC $\pm 10\%$
Short circuit:	51 mA $\pm 10\%$
AC termination impedance:	600 ohms $\pm 10\%$
DC feed resistance:	480 ohms $\pm 10\%$
Loop resistance:	700 ohms, maximum
Ring signal:	90 V <sub>rms</sub> , 20 Hz $\pm 10\%$
Ringer equivalent number:	5.0 REN
Pulse/rotary:	10 PPS to 20 PPS
DTMF:	30 ms on/off $\pm 10\%$
Issues precision	dial tone
Issues receiver	off hook tone
Dialing buffer:	32 digits minimum

## HAR MESSAGE STORAGE AND MANAGEMENT EQUIPMENT

Equipment necessary for storage and management of messages shall be included as part of the HAR and shall comply with the following.

**Message Management.**--The HAR shall be able to receive a live or recorded message from a remote location via the telephone line and/or cellular telephone line or from the operator at the station location. This feature shall not require the use of hand tools.

The message shall be stored in a solid-state recorder/player, with the ability for selecting and checking the message prior to transmission.

**Solid-state Recorder/player.**--Non-volatile solid-state memory shall be used for message storage. Magnetic media will not be acceptable.

A DTMF decoder shall be provided for programming and control of the recorder using a standard DTMF telephone. This function shall be possible, both remotely, via the telephone line interface, and at the station location. The DTMF tones shall not be recorded on the message.

Memory storage capacity shall be provided for a minimum of 250 different messages, with a minimum of 860 seconds total recording time. The length of each message shall be continuously variable up to the total recording time available.

The recorder shall have the flexibility for messages to be organized into a minimum of 20 different playlists with a minimum total of 100 different messages contained within the 20 playlists.

An internal clock shall be provided to select and control message play-back by day, hour and minute.

The system shall allow the recording of a message while another message is being broadcast.

Recording features shall include:

- Monitor off-air RF output of transmitter
- Recording message
- Playback of recorded message

Erasing of message  
Set time spacing between messages  
Set playlist sequence  
Hear playlist sequence  
Set recording source input (dynamic microphone, cassette player (auxiliary audio input), and control telephone)  
Set recording speed  
Set background source materials message.  
Set alternate audio source  
Set clock time and day of the week (clock time shall be in military time and day of week shall be from 1 to 7, where 1 is Sunday)  
Set message schedules  
Hear message schedules  
Cancel message schedules  
Set playlist number  
Hear playlist number  
Cancel playlist number  
Stop record  
Set remote record security code

Note 1: The days of the week shall be numbered consecutively from 1 to 7 beginning with Sunday.

The functions of recording and editing shall be accessible remotely or locally.  
The recorder shall be able to be configured in the message repeater mode using DTMF tones.  
Frequency response shall be from 200 to 10,000 Hz.  
The solid state recorder/player shall have the following functions:

Recorder/Player Function	Function Access Tone	Command Action Tone
Turn transmitter on	*62#	2008#
Turn transmitter off	*62#	2009#
Recording message	*1#	(message number)#
Playback of recorded message	*2#	(message number)# 999# playback all in order (1000+message number)#beginning only 1999# beginning of all (message number)#
Erasing of message	*3#	
Set time spacing between messages	*4#	(spacing in seconds)#
Set selected message sequence	*5#	(Message number)#(message number)#, etc. 999# play all in order % repeat
Hear selected message sequence	*6#	
Cancel selected message sequence	*5#	0#
Set local recording source	*7#	1# Dynamic microphone 2# Cassette player aux 3# Control telephone
Set recording speed (see note 1)	*8#	1# 859 seconds 1004# 644 seconds 2# 481 seconds 1011# 266 seconds
Set single audio source	*9#	0# Prevents play through

Set clock time and day of the week	*21#	(Day number)# (Four digit military time)#
Create play list number	*41#	(Play list number)# (Message number)#(message number)#, etc.
Hear play list number	*42#	(Play list number)#
Schedule play list	*43#	(Play list number)#
Cancel play list number	*44#	(Play list number)# 999# Cancel all play lists
Schedule play list by day	*22#	(Day number)#(time)#(1000+Play list)
Cancel schedule	24#	(Day number)# 999# Cancel entire week
Terminate programming	*51#1#	
Stop record	#	
Transmitter audio monitor	*62#	7900#
Set remote record security code	*71#	(New code)#

The above described equipment is available from Information Station Specialists, Zeeland, Michigan, (tel) 616-772-2300.

**Memory Power and Back-up.**--The recorder shall operate on 24 VDC  $\pm 5$  percent at a total power consumption not to exceed 10 watts from the source. The recorder memory back-up shall operate on 8 to 24 VDC.

In the event of AC power loss to the digital recorder, the memory power back-up shall automatically maintain messages in the memory for up to two weeks.

#### **HAR TRANSIENT / LIGHTNING PROTECTION**

The transient/lightning (T/L) protection shall be provided for the power line, telephone line, and antenna system.

The (T/L) protection for the power line shall provide as a minimum protection the following:

Number of AC outlets (minimum):	5
Turn-on voltage:	200 volts
Energy rating (minimum): IEEE 8/20 waveform	700 joules
Peak current (minimum):	20,000 amperes
Stand-by current (maximum), for 60 Hz:	1 mA

The (T/L) protection for the telephone line shall provide as a minimum protection the following:

Clamping voltage:	200 volts $\pm 10\%$
Energy rating (minimum):	400 joules
Series resistance (max.):	30 ohms
Response time (maximum):	1 nanosecond

The (T/L) (lightning arrester) protection for the antenna system shall provide as a minimum protection the following:

Clamping voltage:	90 volts $\pm$ 10%
RF power (minimum):	35 watts
Frequency range:	500 kHz to 2 MHz
VSWR (maximum):	1.2 to 1
Insertion loss (maximum):	0.2 dB
Surge current (minimum): IEEE 8/20 waveform	17,000 amperes
Response time (maximum):	5 nanosecond

### FIBERGLASS HIGHWAY ADVISORY RADIO POLES

Highway advisory radio (HAR) poles shall be fiberglass-reinforced thermosetting plastic (FRP) poles as described herein.

FRP HAR pole standards shall consist of a round, fiberglass-reinforced thermosetting plastic poles and bases. FRP HAR poles shall be hollow, tapered or with tapered sections, non-conductive and chemically inert.

FRP pole standards shall conform to the details shown on the plans, and shall conform to the requirements in "Standard Specifications for Structural Supports for Signs, Luminaires, and Traffic Signals" (1985) published by AASHTO, and ANSI Standard: C136.20, "Fiber-Reinforced Plastic (FRP) Lighting Poles."

FRP HAR pole standards specified as "Breakaway" types shall conform to the requirements in National Cooperative Highway Research Program Report 230, "Recommended Procedures for the Safety Performance Evaluation of Highway Appurtenances." Design wind velocity for HAR standard systems shall be 129 km/h.

The poles shall withstand the bending strength test load shown in the following table. The poles shall withstand this load with the handhole in compression. The poles shall not exceed a maximum deflection of 13 percent of the length of the pole above the ground line when subjected to the deflection test load shown in the following table:

TEST LOAD TABLE

Standard Type	Bending Strength Test Load	Deflection Test Load
Type 15F, Type 15F (Breakaway)	2406 N	1606 N
Type 21F, Type 21F (Breakaway)	2562 N	1708 N

Test loads shall be applied in conformance with the requirements in Section 12, "Pole Deflection Measurements," of ANSI Standard: C 136.20. Poles shall be loaded 300 mm below the tip.

FRP pole standards shall be the anchor base type unless otherwise indicated.

The manufacturer of FRP HAR pole standards shall have an approved testing and quality control program on file at the Transportation Laboratory, P.O. Box 19128, 5900 Folsom Boulevard, Sacramento, CA 95819 prior to fabricating pole standards for this contract.

The Contractor shall provide the Engineer a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall certify that the pole standards conform to the requirements in the specifications and were manufactured in conformance with the approved testing and quality control program. The certificate shall also include the date of the certificate, reference job number, manufacturer product catalog number, pole type number, dates of manufacture and the signature of the manufacturer's management person responsible for the testing and quality control program.

**Construction.**—Poles shall be constructed from ultraviolet-resistant resin which shall be pigmented light gray and be of uniform color throughout the entire body of the pole. The finish of poles shall be smooth.

Each pole shall have 3 handholes and handhole covers. The cover over the handhole nearest the base shall bear the name of the manufacturer. The handhole covers shall be securely attached to the pole with tamper-resistant hardware. The handholes shall be located as shown in the plans.

Each pole standard shall be provided with a removable aluminum or galvanized steel pole top cap.

Each pole standard shall have an identification plate conforming to the provisions in the second paragraph of Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications. The identification plate shall show the pole standard type, manufacturer's name, manufacturer's part number and the year of fabrication. If the FRP HAR pole standard is a breakaway type, the identification plate shall include the word "BREAKAWAY". The plate shall be located either on the anchor base or just above the base handhole.

**Exterior Protection.**—An aliphatic-type acrylic-modified polyurethane coating shall be applied to the exterior of the fiberglass pole. The coating shall be semi-gloss, highly weather resistant and light gray in color matching the color of the

resin and shall have a minimum 0.075-mm dry film thickness. A one-liter can of the coating to match the poles shall be supplied with each order of poles. The polyurethane coating shall be tested for adhesion to the pole surface in conformance with the requirements in ASTM Designation: D 3359, Method A and shall have a scale rating of 5A. The adhesion testing shall be conducted before and after the accelerated weathering evaluation.

The finished surface of the poles shall be capable of withstanding a minimum of 2500 hours of accelerated weathering when tested in conformance with the requirements in ASTM Designation: G 53. Lamps shall be UV-B (313 nm wavelength). The testing cycle shall be 4 hours ultraviolet (UV) exposure at 60°C, then 4 hours condensate exposure at 40°C.

After testing, the finished surface of the poles shall exhibit the following:

Fiber exposure	None
Crazing	None
Checking	None
Chalking	Very slight
Change in color	May dull slightly
Paint adhesion	5A scale rating, per ASTM Designation: D 3359, Method A using Permacel 99 tape.

**Packaging.**—Each pole shall be spiral wrapped in its entirety with a weatherproof wrap for protection during shipping and storage.

### GROUND SYSTEM

The ground system shall be the ground plane type, the ground rod type, or the triad ground type, as shown on the plans and described in these special provisions.

The ground system shall allow the maximum FCC field strength to be achieved on any frequency from 530 kHz to 1710 kHz with 10 watts or less of output power.

### HAR INSTALLATION

HAR equipment shall be installed at the locations shown on the plans. The Contractor shall terminate the power conductors on the TBS terminal of the controller cabinet enclosure.

The installation shall be under the immediate supervision of a person holding a general class radio telephone operators license.

### SERVICE MANUALS

The Contractor shall provide 10 service manuals which will contain the following described sections.

**Introduction.**--Each manual shall contain a general information section which shall include the following items:

- A list of applicable sub-assemblies that comprise the specified equipment.
- Overall description of the equipment design features, performance, and applications.
- Equipment specifications summary.
- Equipment installation instructions, if applicable.

**Theory of Operation Section.**--Each manual shall contain equipment theory of operation section which shall include the following items:

- Theory of operation of the standard equipment, with unique or unusual circuitry described in detail.
- Theory of operation reflecting any modifications to the standard equipment.

**Maintenance Section.**--Each manual shall contain an equipment maintenance section which shall include the following items:

- Recommended test equipment and fixtures, or minimum operational and performance requirements for appropriate test equipment.
- Troubleshooting information and charts.
- Removal and installation procedures for replacing assemblies and subassemblies, if not obvious or if improper sequencing of steps may result in component damage.

**Replacement Parts Section.**--Each manual shall contain an equipment replacement parts section which shall include a component parts list(s) including electrical parts, mechanical parts, and assemblies. All semiconductors shall be identified by the supplier's numbers and, as applicable, by JEDEC numbers.

**Diagram Section.**--Each manual shall contain an equipment diagram section which shall include the following items:

Schematic diagram(s) identifying all circuit components and showing normal test voltages and levels.

An overall functional block diagram.

Detailed interconnecting diagram(s) showing wiring between modules, circuit boards, and major components.

Pictorial circuit board layout diagram(s) showing both component placement and printed wiring detail.

Diagram(s) showing location of circuit boards and other subassemblies.

Exploded view diagram(s) of complex mechanical assemblies.

**Physical Requirements.**--Each manual shall conform to the following physical requirements:

All pages, including latest revisions, shall be securely fastened together between protective covers (loose-leaf ring binding is acceptable).

No page shall be subject to fading from exposure to any normal source of ambient lighting (ozalid reproduced pages are not acceptable).

The cover or first page shall be marked in any manner to show the Caltrans Contract number and advertising and bid opening dates.

#### **ARRESTOR ENCLOSURE**

The arrestor enclosure shall be a NEMA Type 3R with hinged cover, as shown on the plans with dimensions of 406mm X 254mm X 152mm, and shall have provisions for padlocking. An aluminum plate shall be installed vertically, facing the door, in the enclosure as shown on the plans. The Contractor shall terminate the ground conductor(s) with an aluminum-copper NEMA one and/or three bolt hold tongue. The ground conductor(s) and lightning arrestor shall be mounted on the aluminum plate.

#### **ANTENNA COAXIAL CABLE (ACC)**

The ACC shall consist of an RG-8/U single foil single braid flexible coaxial cable with a solid bare copper center conductor, Cellular Polyethylene dielectric, 97 percent tinned copper braid, and 100 percent shield coverage and shall conform to the following requirements:

Electrical Characteristics	
Capacitance	26 pF/ft (nominal)
Impedance	50 ohms (nominal)
Velocity of propagation	78% (nominal)
DC loop resistance	1.2 ohms per 1000 ft. (nominal) @ 20° C.

Attenuation at 20° C.	
Frequency (MHz)	Nominal dB/100 ft
10.0	0.50
50.0	1.2
100.0	1.6
200.0	2.4

Physical Dimensions	
	Nominal O.D. (inches)
Center conductor	0.103
Dielectric	0.285
Outer jacket	0.405

### ANTENNA FEEDING CABLE (AFC)

The AFC shall consist of a No. 12 AWG solid copper conductor. The AFC shall have a length necessary to connect the lighting arrestor and the antenna without causing stress to the cable and shall be terminated with a UHF plug and a reducing adapter as specified elsewhere in these special provisions.

After installing the AFC between the arrestor enclosure and the antenna, the Contractor shall seal the 38 mm nipple near the top of the fiberglass pole.

### COAXIAL CABLE CONNECTORS (FOR TYPE ACC AND AFC)

Coaxial cable connectors for attaching Type ACC and AFC including the reducing adapter shall be UHF Standard and meet the following requirements:

Electrical Characteristics	
Impedance:	50 ohms (nominal)
Frequency range:	0 - 300 MHz
Voltage rating:	500 volts peak

Mechanical	
Mating:	Standard size: 5/8- 24 threaded coupling. Push-on mates with any standard size threaded receptacle
Method of attachment:	Clamp and Crimp.
Composition:	Bodies- Brass or die cast zinc Contacts- brass, silver plated Insulators- TFC, copolymer of styrene, polystyrene, mica-filled phenolic and/or, PBT polyester or equal Plating- ASTRO plate and silver Other metal parts- Brass

Environmental	
Temperature	-55 ° C to +165 ° C
Moisture	Weather resistant design.

### SYSTEM TESTING

**Ground System Testing.**--The Contractor shall take certified measurements after the installation of the ground system.

The testing shall utilize an earth resistance meter and be conducted in accordance with IEEE Standard 3-point fall of potential method.

The Contractor provide all test equipment, take and document resistivity measurements on the grounding system as specified elsewhere in these special provisions and submit them to the Engineer for approval.

**Cable Testing.**--The antenna coaxial cable (ACC) will be tested by the Engineer. Those cables found to have faults shall be replaced. The testing shall utilize a time domain reflectometer.

A fault in a length of cable is defined as any of the following:

1. A return loss measurement indicating that there is a short in the cable.
2. A return loss measurement indicating a cut or open circuit in the cable.
3. A visual inspection which reveals exposure or damage to the cable shielding.

**HAR Testing.**--After all HAR equipment has been installed, the Contractor shall test the HAR.

Minimum test equipment required for testing the HAR shall consist of:

1. Dummy load, 50 ohms
2. Power meter



3. Communications monitor
4. Field strength meter

The Contractor shall tune the HAR with the impedance matching network of the coupling unit by adjusting the stainless steel tip of the antenna.

The HAR shall be considered tuned when the system's voltage standing-wave ratio (vswr) is at the lowest possible value as directed by the Engineer.

After the HAR has been tuned, the Contractor shall record and transmit a test message with the output power level of the transmitter set at approximate 10 watts or lower. Modulation shall be adjusted between 85 to 95 percent as specified by the FCC for the standard AM broadcast band.

The Contractor shall make actual on-the-air field strength measurements. A sufficient number of points shall be selected in order to determine the distance at which the attenuated field of 2 mV/m exists, as measured with a calibrated standard field strength meter. This may be done in a 5 to 8 radial directions facilitating a plot of a 2 mV/m at a distance of 1.5 km from the HAR antenna. If the measured field exceeds 2 mV/m at a distance of 1.5 km, the transmitter output power shall be decreased accordingly and if the measured field is less than 2 mV/m at the same distance then the power may be increased as directed by the Engineer.

At the completion of all HAR testing the Contractor shall submit a written report of all measurements to the Engineer for approval. The report shall include a map, with scale, showing a 2 mV/m contour based on the actual on-the-air field strength measurements. The VSWR, percent modulation and transmitter output power measurements shall be tabulated.

### **10-3.18 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT**

Salvaged electrical materials shall be hauled to a site within 160 kilometers of the job site, as directed by the Engineer, and stockpiled.

The Contractor shall provide equipment, as necessary, to safely unload and stockpile the material. A minimum of 2 working days' notice shall be given prior to delivery.

### **10-3.19 PAYMENT**

Full compensation for changeable message signs shall be considered as included in the contract lump sum price paid for modify lighting and sign illumination and no separate payment will be made therefor.

Full compensation for hauling and stockpiling electrical materials shall be considered as included in the contract price paid for the item requiring the material to be salvaged, and no additional compensation will be allowed therefor.

## **SECTION 10-4. FIBER OPTIC CABLE PLANT SPECIFICATIONS**

### **10-4.01 FIBER OPTICS GLOSSARY**

**Active Component Link Loss Budget.**— The active component link loss budget is the difference between the average transmitter launch power (in dBm) and the receiver maximum sensitivity (in dBm).

**Backbone.**— Fiber cable that provides connections between the TMC and hubs, as well as between equipment rooms or buildings, and between hubs. The term is used interchangeably with "trunk" cable.

**Connector.**—A mechanical device used to align and join two fibers together to provide a means for attaching to and decoupling from a transmitter, receiver, or another fiber (patch panel).

**Connectorized.**—The termination point of a fiber after connectors have been affixed.

**Connector Module Housing (CMH).**—A patch panel used to terminate singlemode fibers with most common connector types. It may include a jumper storage shelf and a hinged door.

**Couplers.**—Couplers are devices which mate fiber optic connectors to facilitate the transition of optical light signals from one connector into another. They are normally located within FDUs, mounted in panels. They may also be used unmounted, to join two simplex fiber runs.

**Distribution Cable.**—Fiber cable that provides connections between hubs. Drop cables are typically spliced into a distribution cable.

**Drop Cable.**—Fiber cable that provides connections between a distribution cable to a field element. Typically these run from a splice vault to a splice tray within a field cabinet. Drop cables are usually short in length (less than 20m) and are of the same construction as outside plant cable. The term “breakout cable” is used interchangeably with drop cable.

**End-to-End Loss.**—The maximum permissible end-to-end system attenuation is the total loss in a given link. This loss could be the actual measured loss, or calculated using typical (or specified) values. A designer should use typical values to calculate the end-to-end loss for a proposed link. This number will determine the amount of optical power (in dB) needed to meet the System Performance Margin.

**Fan Out Termination.**—Permits the branching of fibers contained in an optical cable into individual cables and can be done at field locations; thus, allowing the cables to be connectorized or terminated per system requirements. A kit provides pull-out protection for individual bare fibers to support termination. It provides three layers of protection consisting of a Teflon inner tube, a dielectric strength member, and an outer protective PVC jacket. Fan out terminations shall not be used for more than 6 fibers. Using a patch panel would be appropriate.

**Fiber Distribution Frame (FDF).**—A rack mounted system that is usually installed in hubs or the Transportation Management Center (TMC), that may consist of a standard equipment rack, fiber routing guides, horizontal jumper troughs and Fiber Distribution Units (FDU). The FDF serves as the termination and interconnection of passive fiber optic components from cable breakout, for connection by jumpers, to the equipment.

**Fiber Distribution Unit (FDU).**—An enclosure or rack mountable unit containing both a patch panel with couplers and splice tray(s). The unit’s patch panel and splice trays may be integrated or separated by a partition.

**F/O.**—Fiber optic.

**FOIP.**—Fiber optic inside plant cable.

**FOOP.**—Fiber optic outside plant cable.

**FOTP.**—Fiber optic test procedure(s) as defined by TIA/EIA standards.

**Jumper.**—A short cable, typically one meter or less, with connectors on each end, used to join two CMH couplers or a CMH to active electronic components.

**Light Source.**—Portable fiber optic test equipment that, when coupled with a power meter, is used to perform end-to-end attenuation testing. It contains a stabilized light source operating at the wavelength of the system under test.

**Link.**—A passive section of the system, the ends of which are connectorized. A link may include splices and couplers. For example, a video link may be from a F/O transmitter to a video multiplexer (MUX).

**Loose Tube Cable.**—Type of cable construction in which fibers are placed in buffer tubes to isolate them from outside forces (stress). A flooding compound or material is applied to the interstitial cable core to prevent water migration and penetration. This type of cable is primarily for outdoor applications.

**Mid-span Access Method.**—Description of a procedure in which fibers from a single buffer tube are accessed and spliced to an adjoining cable without cutting the unused fibers in the buffer tube, or disturbing the remaining buffer tubes in the cable.

**MMFO.**—Multimode Fiber Optic Cable.

**Optical Time Domain Reflectometer (OTDR).**—Fiber optic test equipment similar in appearance to an oscilloscope that is used to measure the total amount of power loss in a F/O cable between two points. It provides a visual and printed display of the losses associated with system components such as fiber, splices and connectors.

**Optical Attenuator.**—An optical element that reduces the intensity of a signal passing through it.

**Patchcord.**—A term used interchangeably with "jumper".

**Patch Panel.**—A precision drilled metal frame containing couplers used to mate two fiber optic connectors.

**Pigtail.**—A short optical fiber permanently attached to a source, detector, or other fiber optic device.

**Power Meter.**—Portable fiber optic test equipment that, when coupled with a light source, is used to perform end-to-end attenuation testing. It contains a detector that is sensitive to light at the designed wavelength of the system under test. Its display indicates the amount of optical power being received at the end of the link.

**Riser Cable.**—NEC approved cable installed in a riser (a vertical shaft in a building connecting floors).

**Segment.**—A section of F/O cable that is not connected to any active device and may or may not have splices per the design.

**SMFO.**—Singlemode Fiber Optic Cable.

**Splice.**—The permanent joining of two fiber ends using a fusion splicer.

**Splice Closure.**—A environmentally sealed container used to organize and protect splice trays. The container allows splitting or routing of fiber cables from multiple locations. Normally installed in a splice vault.

**Splice Module Housing (SMH).**—A unit that stores splice trays as well as pigtails and short cable lengths. The unit allows splitting or routing of fiber cables to or from multiple locations.

**Splice Tray.**—A container used to organize and protect spliced fibers.

**Splice Vault.**—An underground container used to house excess cable and/or splice closures.

**System Performance Margin.**—A calculation of the overall "End to End" permissible attenuation from the fiber optic transmitter (source) to the fiber optic receiver (detector). The system performance margin should be at least 6 dB. This includes the difference between the active component link loss budget, the passive cable attenuation (total fiber loss) and the total connector/splice loss.

**Tight Buffered, Non-Breakout Cable (Tight Buffer Cable).**—Type of cable construction where each glass fiber is tightly buffered (directly coated) with a protective thermoplastic coating to 900 µm (compared to 250 µm for loose tube fibers).

## **10-4.02 FIBER OPTIC OUTSIDE PLANT CABLE**

### **10-4.02A GENERAL**

Each fiber optic outside plant cable (FOOP) for this project shall be all dielectric, gel filled or water-blocking material, duct type, with loose buffer tubes and shall conform to these special provisions. Cables with singlemode fibers shall contain 48 singlemode (SM) dual-window (1310 nm and 1550 nm) fibers. The optical fibers shall be contained within loose buffer tubes. The loose buffer tubes shall be stranded around an all dielectric central member. Aramid yarn or fiberglass shall be used as a primary strength member, and a polyethylene outside jacket shall provide for overall protection.

All fiber optic (F/O) cable on this project shall be from the same manufacturer, who is regularly engaged in the production of this material.

The cable shall be qualified as compliant with RUS Federal Rule 7CFR1755.900.

CABLE TYPE	DESCRIPTION
A	2SMFO
B	4SMFO
C	6SMFO
D	8SMFO
E	12SMFO
F	24SMFO
G	36SMFO
H	48SMFO
J	60SMFO
K	72SMFO
L	144SMFO

#### 10-4.02B FIBER CHARACTERISTICS

Each optical fiber shall be glass and consist of a doped silica core surrounded by concentric silica cladding. All fibers in the buffer tube shall be usable fibers, and shall be sufficiently free of surface imperfections and occlusions to meet the optical, mechanical, and environmental requirements of these specifications. The required fiber grade shall reflect the maximum individual fiber attenuation, to guarantee the required performance of each and every fiber in the cable.

The coating shall be a dual layered, UV cured acrylate. The coating shall be mechanically or chemically strippable without damaging the fiber.

The cable shall comply with the optical and mechanical requirements over an operating temperature range of -40°C to +70°C. The cable shall be tested in accordance with EIA-455-3A (FOTP-3), "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components." The change in attenuation at extreme operational temperatures (-40°C to +70°C) for singlemode fiber shall not be greater than 0.20 dB/km, with 80 percent of the measured values no greater than 0.10 dB/km. The singlemode fiber measurement is made at 1550 nm.

For all fibers the attenuation specification shall be a maximum attenuation for each fiber over the entire operating temperature range of the cable.

Singlemode fibers within the finished cable shall meet the requirements in the following table:

Fiber Characteristics Table	
Parameters	Singlemode
Type	Step Index
Core diameter	8.3 $\mu\text{m}$ (nominal)
Cladding diameter	125 $\mu\text{m}$ $\pm$ 1.0 $\mu\text{m}$
Core to Cladding Offset	0.8 $\mu\text{m}$
Coating Diameter	250 $\mu\text{m}$ $\pm$ 15 $\mu\text{m}$
Cladding Non-circularity defined as: [1-(min. cladding dia $\div$ max. cladding dia.)] $\times$ 100	1.0%
Proof/Tensile Test	345 Mpa, min.
Attenuation: (-40°C to +70°C) @1310 nm @1550 nm	0.4 dB/km 0.3 dB/km
Attenuation at the Water Peak	2.1 dB/km @ 1383 $\pm$ 3 nm
Chromatic Dispersion: Zero Dispersion Wavelength Zero Dispersion Slope	1301.5 to 1321.5 nm 0.092 ps/(nm <sup>2</sup> *km)
Maximum Dispersion:	3.3 ps/(nm*km) for 1285 – 1330 nm <18 ps/(nm*km) for 1550 nm
Cut-Off Wavelength	<1250 nm
Mode Field Diameter (Petermann II)	9.3 $\pm$ 0.5 $\mu\text{m}$ at 1300 nm 10.5 $\pm$ 1.0 $\mu\text{m}$ at 1550 nm

#### 10-4.02C COLOR CODING

In buffer tubes containing multiple fibers, each fiber shall be distinguishable from others in the same tube by means of color coding according to the following:

- |                |                 |
|----------------|-----------------|
| 1. Blue (BL)   | 7. Red (RD)     |
| 2. Orange (OR) | 8. Black (BK)   |
| 3. Green (GR)  | 9. Yellow (YL)  |
| 4. Brown (BR)  | 10. Violet (VL) |
| 5. Slate (SL)  | 11. Rose (RS)   |
| 6. White (WT)  | 12. Aqua (AQ)   |

Buffer tubes containing fibers shall also be color coded with distinct and recognizable colors according to the same table listed above for fibers.

These colors shall be targeted in accordance with the Munsell color shades and shall meet EIA/TIA-598 "Color Coding of Fiber Optic Cables."

The color formulation shall be compatible with the fiber coating and the buffer tube filling compound, and be heat stable. It shall not fade or smear or be susceptible to migration and it shall not affect the transmission characteristics of the optical fibers and shall not cause fibers to stick together.

#### 10-4.02D CABLE CONSTRUCTION

**General.**— The fiber optic cable shall consist of, but not be limited to, the following components:

- A. Buffer tubes
- B. Central member
- C. Filler rods
- D. Stranding
- E. Core and cable flooding
- F. Tensile strength member
- G. Ripcord
- H. Outer jacket

**Buffer tubes.**— Clearance shall be provided in the loose buffer tubes between the fibers and the inside of the tube to allow for expansion without constraining the fiber. The fibers shall be loose or suspended within the tubes. The fibers shall not adhere to the inside of the buffer tube. Each buffer tube shall contain a maximum of 12 fibers.

The loose buffer tubes shall be extruded from a material having a coefficient of friction sufficiently low to allow free movement of the fibers. The material shall be tough and abrasion resistant to provide mechanical and environmental protection of the fibers, yet designed to permit safe intentional "scoring" and breakout, without damaging or degrading the internal fibers.

Buffer tube filling compound shall be a homogeneous hydrocarbon-based gel with anti-oxidant additives and used to prevent water intrusion and migration. The filling compound shall be non-toxic and dermatologically safe to exposed skin. It shall be chemically and mechanically compatible with all cable components, non-nutritive to fungus, non-hygroscopic and electrically non-conductive. The filling compound shall be free from dirt and foreign matter and shall be readily removable with conventional nontoxic solvents.

Buffer tubes shall be stranded around a central member by a method, such as the reverse oscillation stranding process, that will prevent stress on the fibers when the cable jacket is placed under strain.

**Central Member.**— The central member which functions as an anti-buckling element shall be a glass reinforced plastic rod with similar expansion and contraction characteristics as the optical fibers and buffer tubes. To ensure the proper spacing between buffer tubes during stranding, a symmetrical linear overcoat of polyethylene may ~~shall~~ be applied to the central member to achieve the optimum diameter.

**Filler rods.**— Fillers may be included in the cable to maintain the symmetry of the cable cross-section. Filler rods shall be solid medium or high density polyethylene. The diameter of filler rods shall be the same as the outer diameter of the buffer tubes.

**Stranding.**— Completed buffer tubes shall be stranded around the overcoated central member using stranding methods, lay lengths and positioning such that the cable shall meet mechanical, environmental and performance specifications. A polyester binding shall be applied over the stranded buffer tubes to hold them in place. Binders shall

be applied with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking (or rendered so by the flooding compound), and dielectric with low shrinkage.

**Core and Cable Flooding.**— The cable core interstices shall contain a water blocking material, to prevent water ingress and migration. The water blocking material shall be either a polyolefin based compound which fills the cable core interstices, or an absorbent polymer, which fills voids and swells to block the ingress of water. The flooding compound or material shall be homogeneous, non-hygroscopic, electrically non-conductive, and non-nutritive to fungus. The compound or material shall also be nontoxic, dermatologically safe and compatible with all other cable components.

**Tensile Strength Member.**— Tensile strength shall be provided by high tensile strength aramid yarns and/or fiberglass which shall be helically stranded evenly around the cable core and shall not adhere to other cable components.

**Ripcord.**— The cable shall contain at least one ripcord under the jacket for easy sheath removal.

**Outer jacket.**— The jacket shall be free of holes, splits, and blisters and shall be medium or high density polyethylene (PE), or medium density cross-linked polyethylene with minimum nominal jacket thickness of 1 mm  $\pm$  0.076 mm. Jacketing material shall be applied directly over the tensile strength members and water blocking material and shall not adhere to the aramid strength material. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.

The jacket or sheath shall be marked with the manufacturer's name, the words "Optical Cable", the number of fibers, "SM", year of manufacture, and sequential measurement markings every meter. The actual length of the cable shall be within -0/+1 percent of the length marking. The marking shall be in a contrasting color to the cable jacket. The height of the marking shall be 2.5 mm  $\pm$  0.2 mm.

#### 10-4.02E GENERAL CABLE PERFORMANCE SPECIFICATIONS

The F/O cable shall withstand water penetration when tested with a one meter static head or equivalent continuous pressure applied at one end of a one meter length of filled cable for one hour. No water shall leak through the open cable end. Testing shall be done in accordance with EIA-455-82 (FOTP-82), "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable."

A representative sample of cable shall be tested in accordance with EIA/TIA-455-81 (FOTP-81), "Compound Flow (Drip) Test for Filled Fiber Optic Cable". No preconditioning period shall be conducted. The cable shall exhibit no flow (drip or leak) at 65°C  $\pm$  80°C as defined in the test method.

Crush resistance of the finished F/O cables shall be 22 N/mm applied uniformly over the length of the cable without showing evidence of cracking or splitting when tested in accordance with EIA-455-41 (FOTP-41), "Compressive Loading Resistance of Fiber Optic Cables". The average increase in attenuation for the fibers shall be 0.10 dB at 1550 nm (singlemode) for a cable subjected to this load. The cable shall not exhibit any measurable increase in attenuation after removal of load. Testing shall be in accordance with EIA-455-41 (FOTP-41), except that the load shall be applied at the rate of 3 mm to 20 mm per minute and maintained for 10 minutes.

The cable shall withstand 25 cycles of mechanical flexing at a rate of 30  $\pm$  1 cycles/minute. The average increase in attenuation for the fibers shall be 0.20 dB at 1550 nm (singlemode) at the completion of the test. Outer cable jacket cracking or splitting observed under 10x magnification shall constitute failure. The test shall be conducted in accordance with EIA-455-104 (FOTP-104), "Fiber Optic Cable Cyclic Flexing Test," with the sheave diameter a maximum of 20 times the outside diameter of the cable. The cable shall be tested in accordance with Test Conditions I and II of (FOTP-104).

The cable shall withstand 20 impact cycles, with a total impact energy of 5.9 N•m. Impact testing shall be conducted in accordance with TIA/EIA-455-25B (FOTP-25) "Impact Testing of Fiber Optic Cables and Cable Assemblies." The average increase in attenuation for the fibers shall be < 0.20 dB at 1550 nm for singlemode fiber. The cable shall not exhibit evidence of cracking or splitting.

The finished cable shall withstand a tensile load of 2700 N without exhibiting an average increase in attenuation of greater than 0.20 dB (singlemode). The test shall be conducted in accordance with EIA-455-33 (FOTP-33), "Fiber Optic Cable Tensile Loading and Bending Test." The load shall be applied for one-half hour in Test Condition II of the EIA-455-33 (FOTP-33) procedure.

#### 10-4.02F PACKAGING AND SHIPPING REQUIREMENTS

Documentation of compliance to the required specifications shall be provided to the Engineer prior to ordering the material.

Attention is directed to "Fiber Optic Testing," elsewhere in these special provisions.

The completed cable shall be packaged for shipment on reels. The cable shall be wrapped in a weather and temperature resistant covering. Both ends of the cable shall be sealed to prevent the ingress of moisture.

Each end of the cable shall be securely fastened to the reel to prevent the cable from coming loose during transit. Four meters of cable length on each end of the cable shall be accessible for testing.

Each cable reel shall have a durable weatherproof label or tag showing the manufacturer's name, the cable type, the actual length of cable on the reel, the Contractor's name, the contract number, and the reel number. A shipping record shall also be included in a weatherproof envelope showing the above information and also include the date of manufacture, cable characteristics (size, attenuation, bandwidth, etc.), factory test results, cable identification number and any other pertinent information.

The minimum hub diameter of the reel shall be at least thirty times the diameter of the cable. The F/O cable shall be in one continuous length per reel with no factory splices in the fiber. Each reel shall be marked to indicate the direction the reel should be rolled to prevent loosening of the cable.

Installation procedures and technical support information shall be furnished at the time of delivery.

## **10-4.03 LABELING**

### **10-4.03A GENERAL**

The Contractor shall label all fiber optic cabling in a permanent consistent manner. All tags shall be of a material designed for long term permanent labeling of fiber optic cables and shall be marked with permanent ink on non-metal types, or embossed lettering on metal tags. Metal tags shall be constructed of stainless steel. Non-metal label materials shall be approved by the Engineer. Labels shall be affixed to the cable per the manufacturer's recommendations and shall not be affixed in a manner which will cause damage to the fiber. Handwritten labels shall not be allowed.

### **10-4.03B LABEL IDENTIFICATION**

**Labeling of Cables.**—Labeling of the backbone, and drop fiber optic cables shall conform to the following unique identification code elements:

UNIQUE IDENTIFICATION CODE ELEMENTS for Backbone, Distribution or Drop Cables		
DESCRIPTION	CODE	NUMBER OF CHARACTERS
District	03r	2
Cable Type	Fiber: S: Singlemode M: Multimode Copper: T: 18 AWG, U: 19 AWG, V: 20AWG, W: 22AWG X: 24 AWG	1
Cable fiber (or copper pairs) Count	Number of fibers or conductor pairs (Examples: 144 fibers; or 100 TWP)	3
Route Number	080	3
Begin Function	T: TMC; H: HUB; V: Video Node; D: Data Node; C: Cable Node; M: CCTV Camera; N: CMS; P: Traffic Signal; Z: Ramp Meter; U: Traffic Monitoring/Count Station/Vehicle Count Station (VDS, TOS); S: Splice Vault	1
Begin Function Number	Unique ID number corresponds to Begin Function (Example: H02 [Hub 02])	2
End Function	T: TMC; H: HUB; V: Video Node; D: Data Node; C: Cable Node; M: CCTV Camera; N: CMS; P: Traffic Signal; Z: Ramp Meter; U: Traffic Monitoring/Count Station; S: Splice Vault	1
End Function Number	Unique ID number corresponds to Begin Function (Example: H03 [Hub 03])	2
Unique Identifier	XX: If two or more cables of the same count are in the same run	2
TOTAL		17

Each cable shall display one unique identification, regardless of where the cable is viewed. The begin function and end function correspond to the end points of each cable. The order of the begin and end function follow a hierarchy as listed below, where the lowest number corresponding to the begin/end function is listed first.

List of Hierarchy										
1	2	3	4	5	6	7	8	9	10	11
TMC	HUB	Video Node (VN)	Data Node (DN)	Cable Node	CCTV Camera	CMS	Traffic Signal	Ramp Meter	Traffic Monitoring/ Count Station	Splice Vault

This scheme will work as follows: A cable between the TMC and a HUB will always have the TMC listed as the start function and the HUB as the end function. Between a CMS and a Splice Vault, the start function will always be listed as the CMS, and so on. If a cable is connected between HUBs, for example HUB-01 and HUB-03, the lowest number, in this case HUB-01, will be listed as the start function and HUB-03 as the end function.



**EXAMPLE 1:** 08S060010H02H0302

This cable is located in District 8, identified as a singlemode fiber optic cable containing 60 fibers, installed along highway Route 10, beginning in Hub 2, and ending in Hub 3, with unique ID of number 2. The implication for the unique ID is that there may be another 60 fiber optic cable between those hubs. This is an example for a backbone cable.

**EXAMPLE 2:** 11S048008H01S04

This cable is located in District 11, identified as a singlemode fiber optic cable containing 48 fibers, installed along highway Route 8, beginning in Hub 1, and ending in Splice Vault 04. In this case, no additional digits are necessary for a unique ID. This is an example for a distribution cable.

**EXAMPLE 3:** 11S006163N03S04

This cable is located in District 11, identified as a singlemode fiber optic cable containing 6 fibers, installed along highway Route 163, beginning at CMS-03, and ending in Splice Vault 04. In this case, no additional digits are necessary for a unique ID. This is an example for a drop cable.

UNIQUE IDENTIFICATION CODE ELEMENTS for JUMPERS (active component to FDU) and PIGTAILS (to connector # on patch panel)		
DESCRIPTION	CODE	NUMBER OF CHARACTERS
Hub Identifier	Hub, TMC, VN or DN ID Numbers or Alphanumeric or both	2
From (Source) Device	MU: Multiplexer FD: FDU (Fiber Distribution Unit) RP: Repeater	2
From (Source) Device Identifier	Numbers or Alphanumeric or both	2
Transmitter or Receiver	T or R	1
To (Destination) Device	MU: Multiplexer FD: FDU (Fiber Distribution Unit) RP: Repeater	2
To (Destination) Device Identifier	Numbers or Alphanumeric or both	2
Connector Identifier	Connector ID	2
TOTAL		13

**EXAMPLE 1:** 01MU01TFD0203.

This pigtail is located in Hub 1, from multiplexer 01, transmitting to FDU 02 to patch panel position (connector) 03.

**EXAMPLE 2:** 02MUA1TFD0B08.

This jumper is located in Hub 2, from multiplexer A1, transmitting to FDU B, to patch panel position (connector) 08.

**10-4.03C LABEL PLACEMENT**

**Cables.**—All cables shall be clearly labeled with the unique identification code element method described elsewhere in these special provisions, at all terminations, even if no connections or splices are made, and at all splice vault entrance and exit points.

**Cable to Cable Splices.**— All cable jackets entering the splice closure shall be labeled in accordance with the identification method described elsewhere in these special provisions.

**Cable to Fiber Distribution Units.**—The cable jackets shall be clearly labeled at entry to the FDU in accordance with the unique identification code element method described elsewhere in these special provisions. In addition, each

fiber shall be labeled with the Fiber ID and pigtails shall be labeled at the connector with the Fiber ID. The FDU shall be clearly labeled with the Cable ID on the face of the FDU. If multiple cables are connected to the FDU, each block of connectors relating to each individual cable shall be clearly identified by a single label with the Cable ID. Individual connections shall be clearly marked on the face of the FDU in the designated area with the Fiber ID.

**Fiber.**—Fibers labels shall be placed next to the connectors of the individual fibers.

**Patch Panels.**—The cable jackets shall be clearly labeled at entry to the Patch Panel in accordance with the unique identification code element method described elsewhere in these special provisions. In addition, each fiber shall be labeled with the Fiber ID and pigtails shall be labeled at the connector with the Fiber ID. The Patch panel shall be clearly labeled with the Cable ID on the face of the Panel. If multiple cables are connected to the Patch Panel, each block of connectors relating to each individual cable shall be clearly identified by a single label with the Cable ID. Individual connections shall be clearly marked on the face of the Panel in the designated area with the Fiber ID.

**Jumpers.**—Equipment to FDU jumpers shall be labeled as to the equipment type connected and shall be labeled at both ends. FDU to FDU jumpers shall be labeled at each end in accordance with the unique identification code element method described elsewhere in these special provisions.

**Pigtails.**—Pigtails shall be labeled at the connector in accordance with the unique identification code element method described elsewhere in these special provisions.

**Copper Cable Labels.**—All twisted-pair communications cables shall be clearly labeled in a in accordance with the unique identification code element method described elsewhere in these special provisions.

#### 10-4.04 CABLE INSTALLATION

Installation procedures shall be in conformance with the procedures specified by the cable manufacturer for the specific cable being installed. The contractor shall submit the manufacturer's recommended procedures for pulling fiber optic cable at least 20 working days prior to installing cable. Mechanical aids may be used provided that a tension measuring device, and a break away swivel are placed in tension to the end of the cable. The tension in the cable shall not exceed 2225 N or the manufacturer's recommended pulling tension, whichever is less.

During cable installation, the bend radius shall be maintained at a minimum of twenty times the outside diameter. The cable grips for installing the fiber optic cable shall have a ball bearing swivel to prevent the cable from twisting during installation.

F/O cable shall be installed using a cable pulling lubricant recommended by the F/O cable and/or the innerduct manufacturer, and a pull tape conforming to the provisions described under "conduit" elsewhere in these special provisions. Contractor's personnel shall be stationed at each splice vault and pullbox through which the cable is to be pulled to lubricate and prevent kinking or other damage.

F/O cable shall be installed without splices except where specifically allowed on the plans. If splice locations are not shown on the plans, splicing shall be limited to one cable splice every 6 km. Any midspan access splice or FDU termination shall involve only those fibers being spliced as shown on the plans. Cable splices shall be located in splice closures, installed in splice vaults shown on the plans. A minimum of 20 m of slack shall be provided for each F/O cable at each splice vault. Slack shall be divided equally on each side of the F/O splice closure.

Unless shown or provided otherwise, only F/O cable shall be installed in each innerduct. Pulling a separate F/O cable into a spare duct to replace damaged fiber will not be allowed.

At the Contractor's option, the fiber may be installed using the air blown method. If integral innerduct is used, the duct splice points or any temporary splices of innerduct used for installation must withstand a static air pressure of 758 kPa.

The fiber installation equipment must incorporate a mechanical drive unit or pusher which feeds cable into the pressurized innerduct to provide a sufficient push force on the cable, which is coupled with the drag force created by the high-speed airflow. The unit must be equipped with controls to regulate the flow rate of compressed air entering the duct and any hydraulic or pneumatic pressure applied to the cable. It must accommodate longitudinally ribbed, or smooth wall ducts from nominal 16 mm to 51 mm inner diameter. Mid assist or cascading of equipment must be for the installation of long cable runs. The equipment must incorporate safety shutoff valves to disable the system in the event of sudden changes in pneumatic or hydraulic pressure.

The equipment must not require the use of a piston or any other air capturing device to impose a pulling force at the front end of the cable, which also significantly restricts the free flow of air through the inner duct. It must incorporate the use of a counting device to determine the speed of the cable during installation and the length of the cable installed.

#### **10-4.05 SPLICING**

Field splices shall be done either in splice vaults or cabinets as shown on the plans. All splices in splice vaults shall be done in splice trays, housed in splice closures. All splices in cabinets shall be done in splice trays housed in FDU's.

Unless otherwise specified, fiber splices shall be the fusion type. The mean splice loss shall not exceed 0.07 dB per splice. The mean splice loss shall be obtained by measuring the loss through the splice in both directions and then averaging the resultant values.

All splices shall be protected with a metal reinforced thermal shrink sleeve.

The mid-span access method shall be used to access the individual fibers in a cable for splicing to another cable as shown on the plans. Cable manufacturers recommended procedures and approved tools shall be used when performing a mid-span access. Only the fibers to be spliced may be cut. All measures shall be taken to avoid damaging buffer tubes and individual fibers not being used in the mid-span access.

The individual fibers shall be looped one full turn within the splice tray to avoid micro bending. A 45 mm minimum bend radius shall be maintained during installation and after final assembly in the optical fiber splice tray. Each bare fiber shall be individually restrained in a splice tray. The optical fibers in buffer tubes and the placement of the bare optical fibers in the splice tray shall be such that there is no discernable tensile force on the optical fiber.

The Contractor will be allowed to splice a total of 10 fibers to repair any damage done during mid-span access splicing without penalty. The Contractor will be assessed a fine of \$300.00 for each additional and unplanned splice. Any single fiber may not have more than 3 unplanned splices. If any fiber requires more than 3 unplanned splices, the entire length of F/O cable must be replaced at the Contractor's expense.

#### **10-4.06 SPLICE CLOSURES**

The F/O field splices shall be enclosed in splice closures which shall be complete with splice organizer trays, brackets, clips, cable ties, seals and sealant, as needed. The splice closure shall be suitable for a direct burial or pull box application. Manufacturer's installation instructions shall be supplied to the Engineer prior to the installation of any splice closures. Location of the splice closures shall be where a splice is required as shown on the plans, designated by the Engineer, or described in these special provisions.

The splice closure shall conform to the following specifications:

- Non-filled thermoplastic case
- rodent proof, water proof, re-enterable and moisture proof
- expandable from 2 cables per end to 8 cables per end by using adapter plates
- cable entry ports shall accommodate 10 mm to 25 mm diameter cables
- multiple grounding straps
- accommodate up to 8 splice trays
- suitable for "butt" or "through" cable entry configurations
- place no stress on finished splices within the splice trays

The splice closure shall be bolted to the side wall of the splice vault.

#### **10-4.06A OUTDOOR SPLICES**

The Contractor shall verify the quality of each splice prior to sealing the splice closure. The splice closure shall not be sealed until link testing is performed and is approved by the Engineer.

#### **10-4.07 SPLICE TRAYS**

Splice trays must accommodate a minimum of 12 fusion splices and must allow for a minimum bend radius of 45 mm. Individual fibers must be looped one full turn within the splice tray to allow for future splicing. No stress is to be applied on the fiber when it is located in its final position. Buffer tubes must be secured near the entrance of the splice tray to reduce the chance that an inadvertent tug on the pigtail will damage the fiber. The splice tray cover may be transparent.

Splice trays in the splice closure shall conform to the following:

- accommodate up to 24 fusion splices
- place no stress on completed within the tray
- stackable with a snap-on hinge cover
- buffer tubes securable with channel straps
- must be able to accommodate a fusion splice with the addition of an alternative splice holder
- must be labeled after splicing is completed.

Only one single splice tray may be secured by a bolt through the center of the tray in the fiber termination unit. Multiple trays must be securely held in place as per the manufacturer's recommendation.

#### **10-4.08 PASSIVE CABLE ASSEMBLIES AND COMPONENTS**

The F/O cable assemblies and components shall be compatible components, designed for the purpose intended, and manufactured by a company regularly engaged in the production of material for the fiber optic industry. All components or assemblies shall be best quality, non-corroding, with a design life of at least 20 years.

The cable assemblies and components manufacturer shall be ISO9001 registered.

#### **10-4.09 FIBER OPTIC CABLE TERMINATIONS**

##### **10-4.09A GENERAL**

Fiber optic outside plant (FOOP) cable entering a building shall be routed as described in these special provisions and as shown on the plans. The cable shall continue within the conduit to the designated termination point for cable termination. All components shall be the size and type required for the specified fiber. Fiber optic cable terminations may take place in several locations such as TMCs, hubs, data nodes, cable nodes, TOS cabinets, camera sites, etc.

##### **10-4.09B CABLE TERMINATION**

Fiber Optic Inside Plant (FOIP) cable shall then be spliced to the incoming cable. At the FDU, the cable jacket of the FOIP or outside plant cable, shall be removed exposing the aramid yarn, filler rods, and buffer tubes. The exposed length of the buffer tubes shall be at least the length recommended by the FDU manufacturer which allows the tubes to be secured to the splice trays. Each buffer tube shall be secured to the splice tray in which it is to be spliced. The remainder of the tubes shall be removed to expose sufficient length of the fibers in order to properly install on the splice tray, as described in "Splicing," elsewhere in these special provisions

The cable shall then be spliced and secured with tie wraps and routed to its appropriate fiber distribution frame/unit (FDF/U) as shown on the plans.

When applicable, moisture blocking gel shall be removed from the exposed buffer tubes and fibers. The transition from the buffer tube to the bundle of jacketed fibers shall be treated by an accepted procedure for sleeve tubing, shrink tube and silicone blocking of the transition to prevent future gel leak. Manufacturer directions shall be followed to ensure that throughout the specified temperature range gel will not flow from the end of the buffer tube. The individual fibers shall be stripped and prepared for splicing.

Factory terminated pigtails shall then be spliced and placed in the splice tray.

All fibers inside a fiber optic cable entering an Fiber Distribution Unit (FDU), such as at a TMC or hub, shall be terminated and labeled. Attention is directed to "Fiber Distribution Unit" elsewhere in these special provisions.

A transition shall then be made, with flexible tubing, to isolate each fiber to protect the individual coated fibers. The final transition from bundle to individual fiber tube shall be secured with an adhesive heat shrink sleeve. Refer to Fan Out Termination, elsewhere in these special provisions.

##### **10-4.09C DISTRIBUTION INTERCONNECT PACKAGE**

Distribution involves connecting the fibers to locations shown on the plans. The distribution interconnect package consists of FDFs and FDUs with connector panels, couplers, splice trays, fiber optic pigtails and cable assemblies with connectors. The distribution interconnect package shall be assembled and tested by a company that is regularly engaged in the assembly of these packages. Attention is directed to "Fiber Optic Testing" elsewhere in these special provisions. All distribution components shall be products of the same manufacturers, who are regularly engaged in the production of these components, and the respective manufacturers shall have quality assurance programs.

##### **10-4.09D FIBER OPTIC CABLE ASSEMBLIES AND PIGTAILS**

**General.**— Cable assemblies (jumpers and pigtails) shall be products of the same manufacturer. The cable used for cable assemblies shall be made of fiber meeting the performance requirements of these special provisions for the F/O cable being connected.

**Pigtails.**— Pigtails shall be of simplex (one fiber) construction, in 900µm tight buffer form, surrounded by aramid for strength, with a PVC jacket with manufacturer identification information, and a nominal outer jacket diameter of 3 mm. Singlemode simplex cable jackets shall be yellow in color. All pigtails shall be factory terminated and tested and at least one meter in length.

**Jumpers.**— Jumpers may be of simplex or duplex design. Duplex jumpers shall be of duplex round cable construction, and shall not have zipcord (siamese) construction. All jumpers shall be at least 2 meters in length, sufficient to avoid stress and allow orderly routing.

The outer jacket of duplex jumpers shall be colored according to the singlemode color (yellow) specified above. The two inner simplex jackets shall be contrasting colors to provide easy visual identification for polarity.

**Connectors.**— Connectors shall be of the ceramic ferrule FC type for SM. Indoor FC connector body housings shall be either nickel plated zinc or glass reinforced polymer construction. Outdoor FC connector body housing shall be glass reinforced polymer.

The associated coupler shall be of the same material as the connector housing.

All F/O connectors shall be the 2.5 mm FC connector ferrule type with Zirconia Ceramic material with a PC (Physical Contact) pre-radiused tip.

The FC connector operating temperature range shall be -40°C to +70°C. Insertion loss shall not exceed 0.4 dB for singlemode, and the return reflection loss on singlemode connectors shall be at least -55 dB. Connection durability shall be less than a 0.2 dB change per 500 mating cycles per EIA-455-21A (FOTP-21). All terminations shall provide a minimum 222 N pull out strength. Factory test results shall be documented and submitted to the Engineer prior to installing any of the connectors. Singlemode connectors shall have a yellow color on the body and/or boot that renders them easily identifiable.

Field terminations shall be limited to splicing of adjoining cable ends and/or cables to FC pigtails.

#### 10-4.09E FIBER DISTRIBUTION UNIT

The Contractor shall furnish and install all components to terminate the incoming fiber optic communication cables.

FDU Type	Accommodates Termination of
D	48 SMFO fibers

The fiber distribution unit (FDU) shall include the following:

A patch panel to terminate the appropriate number of singlemode fibers with ST type connector feed through couplers.

Splice trays.

Storage for splice trays.

A slide out metal drawer for the storage of spare jumpers.

Strain relief shall be provided for the incoming fiber optic cable. Cable accesses shall have rubber grommets or similar material to prevent the cable from coming in contact with bare metal. All fibers shall be terminated and individually identified in the FDU and on the patch panel.

The patch panel shall be hinged or have coupler plates to provide easy access and maintenance. Brackets shall be provided to spool the incoming fiber a minimum of two turns, each turn shall not be less than 300 mm, before separating out individual fibers to the splice tray.

The FDU shall be 482 mm rack mountable.

The FDU shall not exceed 250 mm in height and 380 mm in depth.

#### 10-4.09F FAN OUT TERMINATION

A fan out termination shall be required as shown on the plans designated by the Engineer or described in these special provisions.

For fiber counts of less than 6 fibers, a fan out termination may be used to terminate the incoming fiber optic cable. The connector return loss shall be no greater than -40 dB.

The fan out termination shall consist of a splice connector and the appropriate number of fiber optic pigtails which will be fusion spliced to the incoming fibers.

The pigtail shall be contained in a housing that will provide strain relief between the incoming fiber optic cable plant jacket, buffer tubes, fibers and pigtail jacket material.

Each fiber shall be spliced to a pigtail with a factory installed and polished ST connector, as specified elsewhere in these special provisions. The splices shall then be encapsulated in a weatherproof housing. Each connector shall have a weatherproof cap to protect it from the elements. The pigtail shall be of simplex (one fiber) construction, in a 900 µm tight buffer form, surrounded by Aramid yarn for strength. The buffer shall have a PVC jacket with manufacturer

identification information, and a nominal outer jacket diameter of 3 mm. Singlemode simplex cable jackets shall be yellow in color. All pigtails shall be at least two meter in length.

Each pigtail shall be labeled, as specified elsewhere in these special provisions, and secured onto the cable using clear heat shrink tubing.

## **10-4.10 FIBER OPTIC TESTING**

### **10-4.10A GENERAL**

Testing shall include the tests on elements of the passive fiber optic components: (1) at the factory, (2) after delivery to the project site but prior to installation, (3) after installation but prior to connection to any other portion of the system. The Contractor shall provide all personnel, equipment, instrumentation and materials necessary to perform all testing. The Engineer shall be notified two working days prior to all field tests. The notification shall include the exact location or portion of the system to be tested.

Documentation of all test results shall be provided to the Engineer within 2 working days after the test involved.

A minimum of 15 working days prior to arrival of the cable at the site, the Contractor shall provide detailed test procedures for all field testing for the Engineer's review and approval. The procedures shall include the tests involved and how the tests are to be conducted. Included in the test procedures shall be the model, manufacturer, configuration, calibration and alignment procedures for all proposed test equipment.

### **10-4.10B FACTORY TESTING**

Documentation of compliance with the fiber specifications as listed in the Fiber Characteristics Table shall be supplied by the original equipment manufacturer. Before shipment, but while on the shipping reel, 100 percent of all fibers shall be tested for attenuation. Copies of the results shall be (1) maintained on file by the manufacturer with a file identification number for a minimum of seven years, (2) attached to the cable reel in a waterproof pouch, and (3) submitted to the Contractor and to the Engineer.

### **10-4.10C ARRIVAL ON SITE**

The cable and reel shall be physically inspected on delivery and 100 percent of the fibers shall be attenuation tested to confirm that the cable meets requirements. The failure of any single fiber in the cable to comply with these special provisions, is cause for rejection of the entire reel. Test results shall be recorded, dated, compared and filed with the copy accompanying the shipping reel in a weather proof envelope. Attenuation deviations from the shipping records of greater than five percent shall be brought to the attention of the Engineer. The cable shall not be installed until completion of this test sequence and the Engineer provides written approval. Copies of traces and test results shall be submitted to the Engineer. If the test results are unsatisfactory, the reel of F/O cable shall be considered unacceptable and all records corresponding to that reel of cable shall be marked accordingly. The unsatisfactory reels of cable shall be replaced with new reels of cable at the Contractor's expense. The new reels of cable shall then be tested to demonstrate acceptability. Copies of the test results shall be submitted to the Engineer.

### **10-4.10D AFTER CABLE INSTALLATION**

Index matching gel shall not be allowed in connectors during testing. After the fiber optic cable has been pulled but before breakout and termination, 100 percent of all the fibers shall be tested with an OTDR for attenuation. Test results shall be recorded, dated, compared and filed with the previous copies of these tests. Copies of traces and test results shall be submitted to the Engineer. If the OTDR test results are unsatisfactory, the F/O cable segment of cable shall be unacceptable. The unsatisfactory segment of cable shall be replaced with a new segment, without additional splices, at the Contractor's expense. The new segment of cable then shall be tested to demonstrate acceptability. Copies of the test results shall be submitted to the Engineer.

### **10-4.10E SYSTEM CABLE VERIFICATION AT COMPLETION**

**Power Meter and Light Source.**—At the conclusion of the OTDR testing, 100 percent of the fiber links shall be tested end to end with a power meter and light source, in accordance with EIA Optical Test Procedure 171 and in the same wavelengths specified for the OTDR tests. These tests shall be conducted in one direction. As shown in Appendix A, the Insertion Loss (IC) shall be calculated. Test results shall be recorded, compared, and filed with the other recordings of the same links. Test results shall be submitted to the Engineer. These values shall be recorded in the Cable Verification Worksheet in Appendix A.

**OTDR Testing.**—Once the passive cabling system has been installed and is ready for activation, 100 percent of the fibers shall be tested with the OTDR for attenuation at wavelengths of both 1310 nm and 1550 nm. OTDR testing shall be performed in both directions (bidirectional), on all fibers. Test results shall be generated from software of the test equipment, recorded, dated, compared and filed with previous copies. A hard copy printout and a electronic copy on a DOS based 89 mm diskette of traces and test results shall be submitted to the Engineer. The average of the two losses shall be calculated, and recorded in the Cable Verification Worksheet in Appendix A. The OTDR shall be capable of recording and displaying anomalies of at least 0.02 dB. All connector losses must be displayed on the OTDR traces.

**Cable Verification Worksheet.**—The Cable Verification Worksheet shown in Appendix A shall be completed for all links in the fiber optic system, using the data gathered during cable verification. The completed worksheets shall be included as part of the system documentation.

**Test Failures.**—If the link loss measured from the power meter and light source exceeds the calculated link loss, or the actual location of the fiber ends does not agree with the expected location of the fiber ends (as would occur with a broken fiber), the fiber optic link will not be accepted. The unsatisfactory segments of cable, or splices shall be replaced with a new segment of cable or splice at the Contractor's expense. The OTDR testing, power meter and light source testing and Cable Verification Worksheet shall be completed for the repaired link to determine acceptability. Copies of the test results shall be submitted to the Engineer. The removal and replacement of a segment of cable shall be interpreted as the removal and replacement of a single contiguous length of cable connecting two splices and two connectors. The removal of a small section containing the failure and therefore introducing new unplanned splices, will not be allowed.

#### **10-4.10F PASSIVE COMPONENT PACKAGE TESTING AND DOCUMENTATION**

All components in the passive component package (FDUs, pigtails, jumpers, couplers, and splice trays) shall be from a manufacturer who is ISO9001 registered.

In developing the passive component package, each connector termination (pigtail, or jumper) shall be tested for insertion attenuation loss using an optical power meter and source. In addition, all singlemode terminations shall be tested for return reflection loss. These values shall meet the loss requirements specified earlier and shall be recorded on a tag attached to the pigtail or jumper.

Once an assembly is complete, the manufacturer shall visually verify all tagging of loss values, is complete. As a final quality control measure, the manufacturer shall do an "end to end" optical power meter/light source test from pigtail end to end to the terminating point assure continuity and overall attenuation loss valued.

The final test results shall be recorded, along with previous individual component values, on a special form assigned to each FDU. The completed form shall be dated and signed by the Manufacturer's Quality Control supervisor. One copy of this form will be attached in a plastic envelope to the assembled FDU unit. Copies will be provided separately to the Contractor and to the Engineer, and shall also be maintained on file by the manufacturer or supplier.

The assembled and completed FDU unit shall then be protectively packaged for shipment to the Contractor for installation.

#### **10-4.10G FIBER OPTIC SYSTEM PERFORMANCE MARGIN DESIGN CRITERIA**

The installed system performance margin shall be at least 6 dB for every link. If the design system performance margin is less than 6 dB, the Engineer shall be notified and informed of the Contractor's plan to meet that requirement. The 6 dB system performance margin requirement does not apply when the contractor is only installing the fiber optic cable and not the transceivers. However, any equipment purchased outside the construction contract must meet the 6 dB system performance margin requirement. Test results shall be recorded in the Fiber System Performance Margin Calculations Worksheet in Appendix B.

#### **10-4.10H ACTIVE COMPONENT TESTING**

The transmitters and receivers shall be tested with a power meter and light source, to record the transmitter average output power (dBm) and receiver sensitivity (dBm). These values shall be recorded in the Fiber System Performance Margin Calculations Worksheet in Appendix B, section C, number 6.

**APPENDIX A**  
**Cable Verification Worksheet**  
*End-to-End Attenuation (Power Meter and Light Source) Testing  
and OTDR Testing*

Contract No. \_\_\_\_\_ Contractor: \_\_\_\_\_

Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Link Number: \_\_\_\_\_ Fiber Number: \_\_\_\_\_

Test Wavelength (Circle one):      1310 nm              1550 nm

Expected Location of fiber ends: End 1: \_\_\_\_\_ End 2: \_\_\_\_\_

**Power Meter and Light Source Test Results:**

Power In:	_____ dBm	1A
Output Power:	_____ dBm	1B
Insertion Loss [1A - 1B]:	_____ dB	1C

**OTDR Test Results:**

Forward Loss:	_____ dB	2A
Reverse Loss:	_____ dB	2B
Average Loss [(2A + 2B)/2]:	_____ dB	2C

-----  
To Be Completed by Caltrans:

Resident Engineer's Signature: \_\_\_\_\_

Cable Link Accepted: \_\_\_\_\_



## APPENDIX B

### Fiber System Performance Margin Calculations Worksheet

#### A. Calculate the Passive Cable Attenuation

1. Calculate Fiber Loss at Operating Wavelength: _____ nm	Cable Distance (times) Individual Fiber Loss (equal) @ 1310 nm (0.4 dB/km) @ 1550 nm (0.3 dB/km)	_____ km x _____ dB/km =
<b>Total Fiber Loss:</b>		_____ dB

#### B. Calculate the Total Connector/Splice Loss

2. Calculate Connectors/couplers Loss: (exclude Tx and Rx connectors)	Individual Connector Loss (times) Number of Connector Pairs (equal) <b>Total Connector Loss:</b>	0.4 dB x _____ = _____ dB
3. Calculate Splice Loss:	Individual Splice Loss (times) Number of Splices (equal) <b>Total Splice Loss:</b>	0.1 dB x _____ = _____ dB
4. Calculate Other Components Loss:	<b>Total Components:</b>	_____ dB
5. Calculate Total Losses:	Total Connector Loss (plus) Total Splice Loss (plus) Total Components (equal)	+ _____ dB + _____ dB + _____ dB =
<b>Total Connector/Splice Loss:</b>		_____ dB

#### C. Calculate Active Component Link Loss Budget

System Wavelength:		_____ nm
Fiber Type:		singlemode
Average Transmitter Output (Launch Power):		_____ dBm
Receiver MAX Sensitivity (10 <sup>9</sup> BER) (minus)		_____ dBm
Receiver MIN Sensitivity (equal)		- _____ dBm =
Receiver Dynamic Range:		_____ dB
6. Calculate Active Component Link Loss Budget:	Average Transmitter Output (Launch Power) (minus)	_____ dBm
	Receiver MAX Sensitivity (equal)	- _____ dBm =
Active Component Link Loss Budget:		_____ dB

#### D. Verify Performance

7. Calculate System Performance Margin to Verify Adequate Power:	Active Component Link Loss Budget [C] (minus) Passive Cable Attenuation [A] (minus) Total Connector/Splice Lost [B] (equal)	_____ dB - _____ dB - _____ dB =
<b>System Performance Margin:</b>		_____ dB

## APPENDIX C

### Optical Modem Test Worksheet

Contract No. \_\_\_\_\_ Contractor: \_\_\_\_\_

Operator: \_\_\_\_\_ Date: \_\_\_\_\_

Location: \_\_\_\_\_

DS-1 Optical Modem, Modem No. \_\_\_\_\_ :

Optical Receiver Power (max) into modem ( $10^9$  BER) \_\_\_\_\_ dB 3A

Optical Receiver Level (minimum) into modem \_\_\_\_\_ dB 3B

Receiver Dynamic Range (3A-3B): \_\_\_\_\_ dB 3C

DS-1 Optical Modem, Modem No. \_\_\_\_\_ :

Optical Receiver Power (max) into modem ( $10^9$  BER) \_\_\_\_\_ dB 4A

Optical Receiver Level (minimum) into modem \_\_\_\_\_ dB 4B

Receiver Dynamic Range (4A-4B): \_\_\_\_\_ dB 4C

DS-1 Optical Modem, Modem No. \_\_\_\_\_ :

Optical Receiver Power (max) into modem ( $10^9$  BER) \_\_\_\_\_ dB 5A

Optical Receiver Level (minimum) into modem \_\_\_\_\_ dB 5B

Receiver Dynamic Range (5A-5B): \_\_\_\_\_ dB 5C

DS-1 Optical Modem, Modem No. \_\_\_\_\_ :

Optical Receiver Power (max) into modem ( $10^9$  BER) \_\_\_\_\_ dB 6A

Optical Receiver Level (minimum) into modem \_\_\_\_\_ dB 6B

Receiver Dynamic Range (6A-6B): \_\_\_\_\_ dB 6C

## **VAULTS**

### **VAULT LOCATION AND QUANTITY**

Vaults shall be placed at the location shown on the plans, +/- 20-meters longitudinal, along the roadway,

Vaults shall meet ASSTHO H20-44 (designed for heavy truck traffic with a cast iron cover and lid), and be constructed of Fiberglass Reinforced Polymer resin (FRP), and fiberglass reinforced polymer concrete (FRPC). The materials used for making vaults shall be non-bio-degradable when buried in the ground, exposed to water, and when exposed to ambient temperatures of -20 to +50 degrees Centigrade. All resins shall be commercial grade unsaturated polyester resin. Reinforcing materials shall be commercial grade "E" type glass in the form of roving, continuous strand mat and chop strand mat, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin. Chopped FRP construction is not acceptable.

Polymer Concrete shall be made from the same polyester resin as the FRP with suitable fillers and aggregates to produce a workable mix and high quality finishes. Materials used in manufacture shall have a PC Flexural Modulus of 1.22 million, as described in ASTM C790.

### **VAULT SIZE**

Vaults shall have an inside volume not less than 2.0 cubic meter, with outside dimensions not less than 1200 mm wide by 1200 mm long by 1500 mm deep (4 ft. by 4 ft. by 5 ft.). Alternate shaped vaults, such as round or rectangular may be used at the discretion of the engineer if the total inside volume exceeds 2.0 cubic meter and the completely installed product meets the ASSTHO H20-44 standard for heavy truck traffic.

### **VAULT EXTENSION RINGS**

A minimum of one FRP extension ring, with a minimum thickness of 150mm (6 inches) shall be used for each vault. The design of the vault shall accommodate a total of up to six 75mm rings or three 150 mm (6 inch) rings to accommodate future roadwork or lane additions without requiring removal or relocation of the vault.

### **VAULT EXTERIOR SURFACES**

The exterior surface shall be relatively smooth with no sharp projections. Hand finish work is acceptable if enough resin is present to eliminate fiber show. The exterior surface shall be free of blisters larger than 12.5 mm (.5 inch) in diameter, delamination, or fiber show. The vault shall have a uniform appearance free of visual defects when viewed from a distance of 20 feet.

### **VAULT INTERIOR SURFACES**

The interior surface shall be formed against a solid mold with no exposed fibers. The surface shall be free of crazing, delamination, blisters larger than 12mm (.5 inch diameter and wrinkles of 3 mm (.125 inch) or greater in depth. Surface pits shall be permitted if they are less than 18-mm (.75 inch) in diameter and less than 1.5 mm (.062 inch) deep. Voids that cannot be broken with finger pressure and that are entirely below the resin surface shall be permitted if they are less than 12 mm (.5 inch) in diameter and less than 1.5 mm (.062 inch) deep.

### **VAULT COVER AND FRAME**

Frames and covers shall be of class 30B cast iron according to ASSHTO M 105 and shall meet all applicable requirements of Federal Specification RR-F-612E. Iron castings shall be free from pouring faults, sponginess, cracks, blowholes, and other defects in positions affecting their strength and value for the service intended. Castings shall be boldly filleted at angles and the arises shall be sharp and perfect. All castings must be sandblasted or otherwise effectively cleaned of scale and sand so as to present a clean, smooth surface. All covers shall have a CALTRANS FIBER OPTIC cast into the top surface along with the manufacturer's name and logo. Covers shall be 37 mm (1.5 inches) thick at the outer edges. Covers shall retard the entrance of sheet free flow run-off water.

### **VAULT BOTTOMS**

Vaults shall have an integral bottom, attached to the sidewalls by casting into place with PC to form a substantial and rigid foundation for the vault. The bottom shall be of FRP and shall be at least 8 mm (.3 inch) thick.

### **VAULT CABLE RACKS**

Vaults shall have eight equally spaced galvanized or aluminum (non-rusting) cable racks for hanging fiber and splice enclosures. Each rack shall be not less than 900-mm (3 ft.) long, bolted vertically to the wall, and spaced nominally 300 mm (1-ft.) from the center of each wall. The lower end of each rack shall be 150 mm (6 inches) from the bottom of the vault.

### **VAULT BACKFILL**

Excavations for vaults shall be backfilled with commercial quality concrete containing not less than 350 Kg of cement per cubic meter. Concrete backfill shall be placed as shown on the plans.

### **VAULT DRAINAGE**

A minimum of 200-mm (8 in.) clean crushed rock shall be installed below the vault for water drainage. The rock shall be uniform and spread over the entire bottom area of the vault. At least four 150mm square (6 inch square) drain holes shall be in the vault bottom for drainage, with integral bars or screens to block rodent entry. Bars or screens shall have a maximum spacing of 12 mm (.5 inch) between grates.

### **VAULT STRUCTURAL TESTS**

The vault manufacturer shall provide to the engineer, independent test reports that demonstrate the ability of the completed installation including backfill, to meet the demands of heavy truck traffic as specified in ASSHTO H20-44, and ASTM C857-87, Designation A-16.

A vertical test load of 12,400 lbs. shall cause no signs of distress during or after testing. Cover deflection at 16,000 lbs. shall not exceed 3 mm (.125 inch). A Horizontal test load of 12,400 lbs. shall not produce any distress or permanent damage to the enclosure. Deflections in the sidewall shall not exceed the span/180 at a working load of 4,140 lbs.

### **VAULT CONDUIT ENTRY**

Conduits shall enter the vault through the sidewall at not less than 150 mm (6 inches) and not more than 900 mm (36 inches) from the bottom of the vault. Conduits shall not enter through the bottom of the vault. Watertight terminators are required around all conduits. Conduits shall not protrude more than 50 mm (2 inches) inside the vault and shall enter the vault perpendicular to the vault wall (90 degrees relative to the vault wall), with a tolerance of 20 degrees in both the vertical and horizontal directions.

### **VAULT PULL RINGS**

Two metal pull rings shall be installed in the bottom of the vault near opposite sides of the vault, to facilitate the pulling of fiber optic cables. Rings shall be composed of non rusting metal such as galvanized steel or aluminum, and be designed and installed so as to tolerate the stresses normally found in pulling fiber optic cables.

### **COMPLETION OF VAULT WORK**

When all work to install the vault is completed, including conduit terminations, cable pulls and splices, and any other related work for the job, the vault shall present a clean and orderly appearance. Splice closures, cable slack, and all related items shall all be hung on the vault's cable racks with the bottom of all closures and cables not extending to within 150 mm (6 inches) of the vault bottom. Dirt, tools, debris, and any material unrelated to the function of the vault shall have been removed. No markings such as ink, notes, or other similar items shall be present on the walls or surfaces of the finished vault.

### **TRENCHES**

#### **INTERNAL TRENCH MARKERS**

Fiber optic trench marker tape shall be placed in all trenches containing fiber optic cable. The tape shall be at least 75 mm (3 inches) wide and shall be placed as shown on the plans.

#### **EXTERNAL TRENCH MARKERS**

A pull box marker shall be placed at 100 meter increments and at each vault. Markers shall comply with Class 1, Flexible Post Delineators as shown on Standard Plan Sheet A73C. In the reflectorized portion there shall be placed the letters "FO".

Full compensation for furnishing and installing pull box markers and applying "FO" markings shall be considered as included in the contract lump sum price paid for the 48 singlemode fiber optic cable and no separate payment will be made therefor.

#### **TRENCH TRACER WIRE**

A #8 copper tracer wire shall be installed in all trenches containing fiber optic cable. The wire shall be placed as shown on the plans. Each tracer wire shall have continuity between adjacent vaults and controller cabinet, and must terminate inside each vault and controller cabinet with 150 mm (6 in) of wire extending into the vault.

## **TRENCH SIZE AND DEPTH**

### **TRENCHES IN PAVEMENT TO BE OVERLAID WITH NEW SURFACES**

Throughout the majority of this job, trenches for fiber optic cable will be cut into existing paved shoulder that will be overlaid with new pavement approximately 300 mm (12 inches) thick. In these areas the trench shall be cut into the existing asphalt shoulder and backfilled prior to the addition of new concrete. The centerline of the trench shall be located not more than 1 meter (39 inches) from the outside edge of the asphalt shoulder, at least 600 mm (24 inches) deep, and at least 150 mm (6 inches) wide. When all conduits have been installed, the top of the uppermost conduit shall be at least 300 mm (12 inches) below the top of the trench, and the entire trench back-filled with PCC or Portland cement having a 6 sack or better mix. After the new pavement has been added the uppermost conduit shall be at least 600 mm (24 inches) below the top of the pavement.

### **FIBER OPTIC CONDUIT**

Fiber optic conduit shall be installed by the trenching in pavement method described in the standard specifications except as modified by the details on the plans. A total of eight continuous conduits shall be installed throughout the length of the job. Each conduit shall be a minimum of 32-mm (1.25-inch) internal diameter. Conduits shall be installed in two separate banks of four conduits, with each bank having an orange, blue, white, and gray conduit.

One continuous fiber optic cable, containing 48 strands of single mode fiber, shall be installed in the upper conduit bank, in the orange conduit. The other seven conduits shall be spares for future fiber optic cables.

### **CONDUIT MATERIAL**

High Density polyethylene (HDPE) with a minimum sidewall rating of SDR 11 or Type 3. All ducts for fiber optic cable located on or inside bridges or other highway structures, or conduit that is exposed in any way to the elements (not buried in a trench), shall be composed of UVB resistant, bulletproof fiberglass, rated for – 40 degrees C to + 275 degrees C operation, and capable of withstanding a direct hit from a .45 caliber pistol at not less than 20 feet. Exposed conduits shall be black in color. Bulletproof conduits shall have a minimum inside diameter of 100 mm (4.0 in), and have 4 inner-ducts having an inside diameter of not less than 32 mm (1.25 in). The same material shall be used for all conduits between vaults located at the ends of bridges or other structures. No conversion from one type of conduit to another in between vaults is permitted.

### **CONDUIT TIES**

Non-metallic cable ties or nonmetallic, manufacturer installed conduit locks shall be placed not less than every 1500 mm (5 feet) apart.

### **CONDUIT BENDS**

The minimum bend radius for all fiber optic conduits shall be 1200 mm (4 ft).

### **EXPANSION JOINTS**

Fiber optic ducts on bridge structures shall have watertight expansion joints installed at the bridge expansion joint, in the center of the span, or every 50 meters, whichever is less. Expansion joints shall have a minimum of 100mm of longitudinal movement. Exposed conduit shall have four individual inner-ducts having an inside diameter of 32-mm (1.25-inch).

### **ATTACHMENT TO STRUCTURES**

All exposed conduits attached to bridges shall be attached to the underside of the structure as shown on the plans. Conduits shall be installed with hangers recommended by the manufacturer of the conduit, or as otherwise approved by the engineer. Conduit hangers shall be spaced as recommended by the manufacturer or 1500-mm (5 feet), whichever is less. Hangers shall in no way impact the design of the structure. Metallic surfaces on hangers shall not come in contact with fiberglass conduits located on bridges or structures. Test reports showing the selected hangers' support capacity, bridge design impact, and environmental limits shall be provided to the engineer for review and approval prior to installation on any structure.

### **CONDUIT TESTING**

After conduit installation, trench backfill, and conduit termination into vaults at each end, each conduit and innerduct used shall be tested for uniformity over the entire length between adjacent vaults by pulling or blowing a non-deforming mandrel through the entire length of the conduit. The mandrel shall have a minimum diameter of 25.4-mm (1.00-inch). The mandrel may be pulled or blown simultaneously with fiber or pull tape.

## **SEALING CONDUITS**

After verification of uniformity throughout the length of each conduit, and after pull tape has been installed, unused conduits shall be watertight plugged with devices installable with hand tools. Conduits with fiber optic cable installed shall have watertight sealing plugs installed around the cable at both ends.

## **CONDUIT SPLICING**

Conduits shall be spliced with couplings rated at 869 Kpa and installable with hand tools.

### **10-4.11 PAYMENT**

The contract lump sum price paid for 48 singlemode fiber optic cable shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing fiber optic system, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for splice vaults and splice closures shall be considered as included in the contract lump sum price paid for 48 singlemode fiber optic cable and no separate payment will be made therefor.

## **SECTION 11. (BLANK)**

## **SECTION 12. (BLANK)**

## **SECTION 13. RAILROAD RELATIONS AND INSURANCE**

### **SECTION 13-1. RELATIONS WITH RAILROAD COMPANY**

**13-1.01 GENERAL.--** The term "Railroad" shall be understood to mean the Union Pacific Railroad Company.

It is expected that the Railroad will cooperate with the Contractor to the end that the work may be handled in an efficient manner. However, except for the additional compensation provided for hereinafter for delays in completion of specific unit of work to be performed by the Railroad, the Contractor shall have no claim for damages, extension of time, or extra compensation in the event his work is held up by any of the work to be performed by the Railroad.

The Contractor must understand the Contractor's right to enter Railroads property is subject to the absolute right of Railroad to cause the Contractor's work on Railroad's property to cease if, in the opinion of Railroad, Contractor's activities create a hazard to Railroad's property, employees, and/or operations.

**13-1.02 RAILROAD REQUIREMENTS.--** The contractor shall notify Mr. Paul MacDonald, Senior Manager Industry and Public Projects, 10031 Foothills Blvd., CA 95678, telephone (916) 789-6334 (FAX 916-789-6333) and the State's Engineer, in writing, at least ten (10) working days before performing any work on, or adjacent to the property or tracks of the Railroad.

The Contractor shall cooperate with the Railroad where work is over or under the tracks, or within the limits of Railroad property, in order to expedite the work and to avoid interference with the operation of railroad equipment.

The Contractor shall comply with the rules and regulations of Railroad or the instructions of its representatives in relation to the proper manner of protecting the tracks and property of Railroad and the traffic moving on such tracks, as well as the wires, signals and other property of Railroad, its tenants or licensees, at and in the vicinity of the work during the period of construction.

The Contractor shall perform his work in such manner and at such times as shall not endanger or interfere with the safe operation of the tracks and property of Railroad and traffic moving on such tracks, as well as wires, signals and other property of Railroad, its tenants or licensees, at or in the vicinity of the work.

The Contractor shall take protective measures necessary to keep railroad facilities, including track ballast, free of sand or debris resulting from his operations. Any damage to railroad facilities resulting from Contractor's operations will be repaired or replaced by Railroad and the cost of such repairs or replacement shall be deducted from the contractor's progress and final pay estimates.

The Contractor shall contact the Railroad's "Call Before You Dig" at least 48 hours prior to commencing work, at 1-800-336-9193 (a 24 hour number) to determine location of fiber optics. If a telecommunications system is buried anywhere on or near railroad property, the Contractor will co-ordinate with the Railroad and the Telecommunication Company(ies) to arrange for relocation or other protection of the system prior to beginning any work on or near Railroad Property.

The Contractor shall not pile or store any materials nor park any equipment closer than 25'- 0" to the centerline of the nearest track, unless directed by Railroad's representative.

The Contractor shall also abide by the following temporary clearances during the course of construction:

12'-0" horizontally from centerline of track  
21'-0" vertically above top of rail

The temporary vertical construction clearance above provided will not be permitted until authorized by the Public Utilities Commission. It is anticipated that authorization will be received not later than fifteen days after the approval of the contract by the Attorney General. In the event authorization is not received by the time specified, and, if in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of authorization not being received by the said time, the State will compensate the Contractor for such delay to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications and not otherwise.

Walkways with railing shall be constructed by Contractor over open excavation areas when in close proximity of tracks, and railings shall not be closer than 8'-6" horizontally from centerline of the nearest track, if tangent, or 9'-6" if curved.

Any infringement on the above temporary construction clearances due to the Contractor's operations shall be submitted to the Railroad by way of State's Engineer, and shall not be undertaken until approved by the Railroad, and until the State's Engineer has obtained any necessary authorization from any governmental body or bodies having jurisdiction thereover. No extension of time or extra compensation will be allowed in the event the Contractor's work is delayed pending Railroad approval and governmental authorization.

When the temporary vertical clearance is less than 22'-6" above top of rail, Railroad shall have the option of installing tell-tales or other protective devices Railroad deems necessary for protection of Railroad trainmen or rail traffic.

Three sets of plans and calculations approved by the Engineer, showing details of construction affecting the Railroad's tracks and property not included in the contract plans, including but not limited to shoring and falsework, shall be submitted to the Railroad for approval. Shoring and falsework design shall be in accordance with Southern Pacific Lines (SPL) Guidelines for shoring and falsework, latest edition, issued by the Railroad's Office of Chief Engineer. Shoring and falsework plans and calculations shall be prepared and signed by a registered professional engineer. This work shall not be undertaken until such time as the Railroad has given such approval, review by Railroad may take up to six (6) weeks after receipt of all necessary information.

The Contractor shall notify the Engineer in writing, at least 25 calendar days but not more than 40 days in advance of the starting date of installing temporary work with less than permanent clearance at each structure site. The Contractor will not be permitted to proceed with work across railroad tracks unless this requirement has been met. No extension of time or extra compensation will be allowed in the event that the Contractor's work is delayed because of his failure to comply with the requirements in this paragraph.

Private crossings at grade over tracks of Railroad for the purpose of hauling earth, rock, paving or other materials will not be permitted. If the Contractor, for the purpose of constructing highway-railway grade separation structures, including construction ramps thereto, desires to move equipment or materials across Railroad's tracks, Contractor must first obtain permission from Railroad. Should Railroad approved the crossing, Contractor may be required to execute a private crossing agreement. By this agreement, the Contractor would be required to bear the cost of the crossing surface, together with any warning devices that might be required. Contractor shall furnish his own employees as flagmen to control movements of vehicles on the private roadway and shall take all measures necessary to prevent the use of such roadway by unauthorized persons and vehicles.

No blasting will be permitted by Contractor unless approved by the Railroad.

Contract No. «Dist»-«Contract\_No»

The Contractor shall, upon completion of the work covered by this contract to be performed by Contractor upon the premises or over or beneath the tracks of Railroad, promptly remove from the premises of Railroad all of Contractor's tools, implements and other materials, whether brought upon said premises by said Contractor or any subcontractor, employee or agent of Contractor or of any subcontractor, and cause said premises to be left in a clean and presentable condition.

All under track pipeline installations shall be constructed in accordance with Railroad's current standards which may be obtained from Railroad. The general guidelines are as follows:  
Edges of jacking or boring pit excavations shall be kept a minimum of 20 feet from the centerline of the nearest track. If the pipe to be installed under the track is four (4) inches in diameter or less, the top of the pipe shall be at least 42 inches below base of rail. If the pipe diameter is greater than four (4) inches in diameter, it must be encased and the top of the steel pipe casing shall be at least 66 inches below base of rail. Installation of any pipe or conduit under Railroad's tracks is to be done by dry bore and jack method. No hydraulic jacking or boring will be permitted. Care is to be exercised so as not to damage any underground facilities of Railroad.

### **13-1.03 PROTECTION OF RAILROAD FACILITIES**

(1). Upon advance notification of not less than 72 hours by Contractor, Railroad representatives, conductors, flagmen or watchmen will be provided by Railroad to protect its facilities, property and movements of its trains or engines. In general, Railroad will furnish such personnel or other protective devices:

- (a) When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from centerline of any track on which trains may operate, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.
- (b) For any excavation below elevation of track subgrade if, in the opinion of Railroad's representative, track or other Railroad facilities may be subject to settlement or movement.
- (c) During any clearing, grubbing, grading or blasting in proximity to Railroad which, in the opinion of Railroad's representative, may endanger Railroad facilities or operations.
- (d) During any of Contractor's operations when, in the opinion of Railroad's representatives, Railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines or pipe lines, may be endangered.

(2) The cost of flagging and inspection provided by Railroad during the period of constructing that portion of the project located on or near Railroad property, as deemed necessary for the protection of Railroad's facilities and trains, will be borne by the State for a period of 112 working days beginning on the date work commences on or near property of Railroad. The Contractor shall pay to the State liquidated damages in the sum of \$500 per day for each day in excess of the above 112 working days the Contractor works on or near Railroad property, and which requires flagging protection of Railroad's facilities and trains.

**13-1.04 WORK BY RAILROAD.-** Railroad will furnish or cause to be furnished as necessary due to construction, labor materials, tools and equipment to perform certain works including relocation of telephone, telegraphy and signal lines and appurtenances and will perform any other work in connection therewith.

The work by Railroad will be performed by its own forces and is not a part of the work under this contract.

(a) The Railroad will perform preliminary engineering inspection and flagging as specified in Section 13-1.03 "Protection of Railroad Facilities".

**13-1.05 DELAYS DUE TO WORK BY RAILROAD.-**No delays due to work by Railroad is anticipated.

**13-1.06 LEGAL RELATIONS.-** The provisions of this section, "Relations with Railroad Company" and the provisions of the following section, "Railroad Protective Insurance," of these special provisions shall inure directly to the benefit of Railroad.



## **SECTION 13-2. RAILROAD PROTECTIVE INSURANCE**

The term "Railroad" shall be understood to mean the Union Pacific Railroad Company.

In addition to any other form of insurance or bonds required under the terms of the contract and specifications, the Contractor will be required to carry insurance of the kinds and in the amounts hereinafter specified.

Such insurance shall be approved by the Railroad before any work is performed on Railroad's property and shall be carried until all work required to be performed on or adjacent to the Railroad's property under the terms of the contract is satisfactorily completed as determined by the Engineer, and thereafter until all tools, equipment and materials have been removed from Railroad's property and such property is left in a clean and presentable condition.

The insurance herein required shall be obtained by the successful bidder and he shall furnish the Railroad Agreements Branch, MS # 9, Engineering Service Center, Department of Transportation, State of California, 1801 30th Street, Sacramento, California 95816, with two completed certificates, in the form attached hereto, signed by the insurance company or its authorized agent or representative, reflecting the existence of each of the policies required by 1 and 2 below including coverage for X, C and U and completed operations hazards, the original policy of insurance and one certified copy thereof required by 3 below. Railroad Agreements Branch Engineer will convey one of the certificates of policy certifying 1 and 2 and the original policy of insurance required by 3 to Railroad upon receipt from successful bidder. Engineer will notify successful bidder whether Railroad approves the insurance policies.

Certificate of insurance shall guarantee that the policy under 1 and 2 will not be amended, altered, modified or canceled insofar as the coverage contemplated hereunder is concerned, without at least thirty (30) days notice mailed by registered mail to the Railroad Agreements Branch Engineer and to Railroad.

Full compensation for all premiums which the Contractor is required to pay on all the insurance described hereinafter shall be considered as included in the prices paid for the various items of work to be performed under the contract, and no additional allowance will be made therefor or for additional premiums which may be required by extensions of the policies of insurance.

The approximate ratio of the estimated cost of the work over or under or within 50 feet of Railroad's tracks to the total estimated cost is .001. Approximate daily train traffic is 2 passenger trains and 17 freight trains.

### **1. Contractor's Public Liability and Property Damage Liability Insurance**

The Contractor shall, with respect to the operations he performs within or adjacent to Railroad's property, carry regular Contractor's Public Liability and Property Damage Liability Insurance providing for the same limits as specified for Railroad's Protective Public Liability and Property Damage Liability insurance to be furnished for and in behalf of Railroad as hereinafter provided.

If any part of the work within or adjacent to Railroad's property is subcontracted, the Contractor in addition to carrying the above insurance shall provide the above insurance on behalf of the subcontractors to cover their operations.

### **2. Contractor's Protective Public Liability and Property Damage Liability Insurance.**

The Contractor shall, with respect to the operations performed for him by subcontractors who do work within or adjacent to Railroad's property, carry in his own behalf regular Contractor's Protective Public Liability and Property Damage Liability Insurance providing for the same limits as specified for Railroad's Protective Public Liability and Property Damage Liability Insurance to be furnished for and on behalf of Railroad as hereinafter provided.

### **3. Railroad's Protective Public Liability and Property Damage Liability Insurance**

The Contractor shall, with respect to the operations he performs within or adjacent to Railroad's property or that of any of his subcontractors who do work within or adjacent to Railroad's property perform, have issued and furnished in favor of Railroad, Policy or policies of insurance in the Railroad Protective Liability Form as hereinafter specified.

**Railroad Protective Liability Form**

\_\_\_\_\_  
(Name of Insurance Company)

**DECLARATIONS**

Item 1.     Named Insured:

Union Pacific Railroad Company  
1416 Dodge Street - Mail Code 10049  
Omaha, Nebraska 68179

Item 2.     Policy Period: From \_\_\_\_\_ to \_\_\_\_\_ 12:01 a.m., Standard Time, at the designated job site as stated herein.

Item 3.     The insurance afforded is only with respect to such of the following coverage's as are indicated in Item 6 by specific premium charge or charges. The limit of the company's liability against such coverage or coverage's shall be as stated herein, subject to all the terms of this policy having reference thereto.

		Limits of Liability	
Coverage's		Each Occurrence	Aggregate
A B & C	Bodily Injury Liability Property Damage Liability and Physical Damage to Property	\$2,000,000 Combined Single Limit	\$6,000,000 for Coverage's A, B & C

Item 4.     Name and Address of Contractor:

Item 5.     Name and Address of Governmental Authority for whom the work by the Contractor is being performed: State of California, acting by and through its Department of Transportation, P.O. Box 942874, Sacramento, California 94274-0001.

Item 6. Designation of the Job Site and Description of Work:  
FOR CONSTRUCTION ON

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Premium	Rates per \$100 of Cost		Advance Premiums	
Bases	Coverage A	Coverage's B & C	Coverage A	Coverage's B & C
Contract Cost	\$	\$	\$	\$
Rental Cost	\$	\$	\$	\$

Countersigned \_\_\_\_\_ 19\_\_\_\_ by \_\_\_\_\_

\_\_\_\_\_  
Title

POLICY

\_\_\_\_\_  
(Name of Insurance Company)

A \_\_\_\_\_ insurance company, herein called the company, agrees with the insured, named in the declarations made a part hereof, in consideration of the payment of the premium and in reliance upon the statements in the declaration made by the named insured and subject to all of the terms of this policy:

**INSURING AGREEMENTS**

**I. Coverage A--Bodily Injury Liability.**

To pay on behalf of the insured all sums which the insured shall become legally obligated to pay as damages because of bodily injury, sickness, or disease, including death at any time resulting therefrom, hereinafter called "bodily injury," either (1) sustained by any person arising out of acts or omissions at the designated job site which are related to or are in connection with the work described in Item 6 of the declarations, or (2) sustained at the designated job site by the Contractor or any employee of the Contractor, or by any employee of the Governmental Authority specified in Item 5 of the Declarations, or by any designated employee of the insured whether or not arising out of such acts or omissions.

**Coverage B--Property Damage Liability.**

To pay on behalf of the insured all sums which the insured shall become legally obligated to pay as damages because of physical injury to or destruction of property, including loss of use of any property due to such injury or destruction, hereinafter called "property damage," arising out of acts or omissions at the designated job site which are related to or are in connection with the work described in Item 6 of the declarations.

**Coverage C--Physical Damage to Property.**

To pay for direct and accidental loss of or damage to rolling stock and their contents, mechanical construction equipment, or motive power equipment, hereinafter called "loss," arising out of acts or omissions at

Contract No. «Dist»-«Contract\_No»

the designated job site which are related to or are in connection with the work described in Item 6 of the declarations; provided such property is owned by the named insured or is leased or entrusted to the named insured under a lease or trust agreement.

## II. Definitions.

- (a) **Insured.**--The unqualified word "insured" includes the named insured and also includes any executive officer, director or stockholder thereof while acting within the scope of his duties as such.
- (b) **Contractor.**--The word "contractor" means the Contractor designated in Item 4 of the declarations and includes all subcontractors of said Contractor but shall not include the named insured.
- (c) **Designated employee of the insured.**--The words "designated employee of the insured" mean:
  - (1) any supervisory employee of the insured at the job site,
  - (2) any employee of the insured while operating, attached to or engaged on work trains or other railroad equipment at the job site which are assigned exclusively to the Contractor, or
  - (3) any employee of the insured not within (1) or (2) who is specifically loaned or assigned to the work of the Contractor for prevention of accidents or protection of property, the cost of whose services is borne specifically by the Contractor or by governmental authority.
- (d) **Contract.**--The word "contract" means any contract or agreement to carry a person or property for a consideration or any lease, trust or interchange contract or agreement respecting motive power, rolling stock or mechanical construction equipment.

## III. Defense, Settlement, Supplementary Payments.

With respect to such insurance as is afforded by this policy under Coverage's A and B, the company shall:

- (a) defend any suit against the insured alleging such bodily injury or property damage and seeking damages which are payable under the terms of this policy, even if any of the allegations of the suit are groundless, false or fraudulent; but the company may make such investigation and settlement of any claim or suit as it deems expedient;
- (b) pay, in addition to the applicable limits of liability:
  - (1) all expenses incurred by the company, all costs taxed against the insured in any such suit and all interest on the entire amount of any judgment therein which accrues after entry of the judgment and before the company has paid or tendered or deposited in court that part of the judgment which does not exceed the limit of the company's liability thereon;
  - (2) Premiums on appeal bonds required in any such suit, premiums on bonds to release attachments for an amount not in excess of the applicable limit of liability of this policy, but without obligation to apply for or furnish any such bonds;

- (3) expenses incurred by the insured for such immediate medical and surgical relief to others as shall be imperative at the time of the occurrence;
- (4) all reasonable expenses, other than loss of earnings, incurred by the insured at the company's request.

#### **IV. Policy Period, Territory.**

This policy applies only to occurrences and losses during the policy period and within the United States of America, its territories or possessions, or Canada.

#### **EXCLUSIONS**

This policy does not apply:

- (a) to liability assumed by the insured under any contract or agreement except a contract as defined herein;
- (b) to bodily injury or property damage caused intentionally by or at the direction of the insured;
- (c) to bodily injury, property damage or loss which occurs after notification to the named insured of the acceptance of the work by the governmental authority, other than bodily injury, property damage or loss resulting from the existence or removal of tools, uninstalled equipment and abandoned or unused materials;
- (d) under Coverage's A(1), B and C, to bodily injury, property damage or loss, the sole proximate cause of which is an act or omission of any insured other than acts or omissions of any designated employee of any insured;
- (e) under Coverage A, to any obligation for which the insured or any carrier as his insurer may be held liable under any workmen's compensation, unemployment compensation or disability benefits law, or under any similar law; provided that the Federal Employers' Liability Act, U.S. Code (1946), Title 45, Sections 51-60, as amended, shall for the purposes of this insurance be deemed not to be any similar law;
- (f) under Coverage B, to injury to or destruction of property (1) owned by the named insured or (2) leased or entrusted to the named insured under a lease or trust agreement.
- (g) 1. Under any liability coverage, to injury, sickness, disease, death or destruction
  - (a) with respect to which an insured under the policy is also an insured under a nuclear energy liability policy issued by Nuclear Energy Liability Insurance Association, Mutual Atomic Energy Liability Underwriters or Nuclear Insurance Association of Canada, or would be an insured under any such policy but for its termination upon exhaustion of its limit of liability; or
  - (b) resulting from the hazardous properties of nuclear material and with respect to which (1) any person or organization is required to maintain financial protection pursuant to the Atomic Energy Act of

1954, or any law amendatory thereof, or (2) the insured is, or had this policy not been issued would be, entitled to indemnity from the United States of America, or any agency thereof, under any agreement entered into by the United States of America, or any agency thereof, with any person or organization.

2. Under any medical payments coverage, or under any Supplementary Payments provision relating to immediate medical or surgical relief, to expenses incurred with respect to bodily injury, sickness, disease or death resulting from the hazardous properties of nuclear material and arising out of the operation of a nuclear facility by any person or organization.

3. Under any liability coverage, to injury, sickness, disease, death or destruction resulting from the hazardous properties of nuclear material, if

(a) the nuclear material (1) is at any nuclear facility owned by, or operated by or on behalf of, an insured or (2) has been discharged or dispersed therefrom;

(b) the nuclear material is contained in spent fuel or waste at any time possessed, handled, used, processed, stored, transported or disposed of by or on behalf of an insured; or

(c) the injury, sickness, disease, death or destruction arises out of the furnishing by an insured of services, materials, parts or equipment in connection with the planning, construction, maintenance, operation or use of any nuclear facility, but if such facility is located within the United States of America, its territories or possessions or Canada, this exclusion (c) applies only to injury to or destruction of property at such nuclear facility.

4. As used in this exclusion:

"hazardous properties" include radioactive, toxic or explosive properties;

"nuclear material" means source material, special nuclear material or byproduct material;

"source material", "special nuclear material", and "byproduct material" have the meanings given them in the Atomic Energy Act of 1954 or in any law amendatory thereof;

"spent fuel" means any fuel element or fuel component, solid or liquid, which has been used or exposed to radiation in a nuclear reactor;

"waste" means any waste material (1) containing byproduct material and (2) resulting from the operation by any person or organization of any nuclear facility included within the definition of nuclear facility under paragraph (a) or (b) thereof;

"nuclear facility" means

(a) any nuclear reactor,

(b) any equipment or device designed or used for (1) separating the isotopes of uranium or plutonium, (2) processing or utilizing spent fuel, or (3) handling, processing or packaging waste,

(c) any equipment or device used for the processing, fabricating or alloying of special nuclear material if at any time the total amount of such material in the custody of the insured at the premises where such equipment or device is located consists of or contains more than 25 grams of plutonium or uranium 233 or any combination thereof, or more than 250 grams of uranium 235,

(d) any structure, basin, excavation, premises or place prepared or used for the storage or disposal of waste, and includes the site on which any of the foregoing is located, all operations conducted on such site and all premises used for such operations;

"nuclear reactor" means any apparatus designed or used to sustain nuclear fission in a self-supporting chain reaction or to contain a critical mass of fissionable material;

with respect to injury to or destruction of property, the word "injury" or "destruction" includes all forms of radioactive contamination of property.

- (h) under Coverage C, to loss due to nuclear reaction, nuclear radiation or radioactive contamination, or to any act or condition incident to any of the foregoing.

## CONDITIONS

(The conditions, except conditions 3, 4, 5, 7, 8, 9, 10, 11 and 12, apply to all coverages. Conditions 3, 4, 5, 7, 8, 9, 10, 11 and 12, apply only to the coverage noted thereunder.)

**1. Premium.--**The premium bases and rates for the hazards described in the declarations are stated therein. Premium bases and rates for hazards not so described are those applicable in accordance with the manuals in use by the company.

The term "contract cost" means the total cost of all work described in Item 6 of the declarations.

The term "rental cost" means the total cost to the Contractor for rental of work trains or other railroad equipment, including the remuneration of all employees of the insured while operating, attached to or engaged thereon.

The advance premium stated in the declarations is an estimated premium only. Upon termination of this policy the earned premium shall be computed in accordance with the company's rules, rates, rating plans, premiums and minimum premiums applicable to this insurance. If the earned premium thus computed exceeds the estimated advance premium paid, the company shall look to the Contractor specified in the declarations for any such excess; if less, the company shall return to the said Contractor the unearned portion paid.

In no event shall payment of premium be an obligation of the named insured.

**2. Inspection.--**The named insured shall make available to the company records of information relating to the subject matter of this insurance.

The company shall be permitted to inspect all operations in connection with the work described in Item 6 of the declarations.

**3. Limits of Liability, Coverage A.--**The limit of bodily injury liability stated in the declarations as applicable to "each person" is the limit of the company's liability for all damages, including damages for care and loss of

services, arising out of bodily injury sustained by one person as the result of any one occurrence; the limit of such liability stated in the declarations as applicable to "each occurrence" is, subject to the above provision respecting each person, the total limit of the company's liability for all such damage arising out of bodily injury sustained by two or more persons as the result of any one occurrence.

**4. Limits of Liability, Coverage's B and C.**--The limit of liability under Coverages B and C stated in the declarations as applicable to "each occurrence" is the total limit of the company's liability for all damages and all loss under Coverage B and C combined arising out of physical injury to, destruction or loss of all property of one or more persons or organizations, including the loss of use of any property due to such injury or destruction under Coverage B, as the result of any one occurrence.

Subject to the above provision respecting "each occurrence," the limit of liability under Coverage's B and C stated in the declarations as "aggregate" is the total limit of the company's liability for all damages and all loss under Coverage's B and C combined arising out of physical injury to, destruction or loss of property, including the loss of use of any property due to such injury or destruction under Coverage B.

Under Coverage C, the limit of the company's liability for loss shall not exceed the actual cash value of the property, or if the loss is of a part thereof the actual cash value of such part, at time of loss, nor what it would then cost to repair or replace the property or such part thereof with other of like kind and quality.

**5. Severalty of Interests, Coverage's A and B.**--The term "the insured" is used severally and not collectively, but the inclusion herein of more than one insured shall not operate to increase the limits of the company's liability.

**6. Notice.**--In the event of an occurrence or loss, written notice containing particulars sufficient to identify the insured and also reasonably obtainable information with respect to the time, place and circumstances thereof, and the names and addresses of the injured and of available witnesses, shall be given by or for the insured to the company or any of its authorized agents as soon as practicable. If claim is made or suit is brought against the insured, he shall immediately forward to the company every demand, notice, summons or other process received by him or his representative.

**7. Assistance and Cooperation of the Insured, Coverage's A and B.**--The insured shall cooperate with the company and, upon the company's request, attend hearings and trials and assist in making settlements, securing and giving evidence, obtaining the attendance of witnesses and in the conduct of suits. The insured shall not, except at his own cost, voluntarily make any payment, assume any obligation or incur any expense other than for such immediate medical and surgical relief to others as shall be imperative at the time of accident.

**8. Action Against Company, Coverages A and B.**--No action shall lie against the company unless, as a condition precedent thereto, the insured shall have fully complied with all the terms of this policy, nor until the amount of the insured's obligation to pay shall have been finally determined either by judgment against the insured after actual trial or by written agreement of the insured, the claimant and the company.

Any person or organization or the legal representative thereof who has secured such judgment or written agreement shall thereafter be entitled to recover under this policy to the extent of the insurance afforded by this policy. No person or organization shall have any right under this policy to join the company as a party to any action against the insured to determine the insured's liability. Bankruptcy or insolvency of the insured or of the insured's estate shall not relieve the company of any of its obligations hereunder.

**Coverage C.**--No action shall lie against the company unless, as a condition precedent thereto, there shall have been full compliance with all the terms of this policy nor until 30 days after proof of loss is filed and the amount of loss is determined as provided in this policy.



**9. Insured's Duties in Event of Loss, Coverage C.**--In the event of loss the insured shall:

- (a) protect the property, whether or not the loss is covered by this policy, and any further loss due to the insured's failure to protect shall not be recoverable under this policy; reasonable expenses incurred in affording such protection shall be deemed incurred at the company's request;
- (b) file with the company, as soon as practicable after loss, his sworn proof of loss in such form and including such information as the company may reasonably require and shall, upon the company's request, exhibit the damaged property.

**10. Appraisal, Coverage C.**--If the insured and the company fail to agree as to the amount of loss, either may, within 60 days after the proof of loss is filed, demand an appraisal of the loss. In such event the insured and the company shall each select a competent appraiser, and the appraisers shall select a competent and disinterested umpire. The appraisers shall state separately the actual cash value and the amount of loss and failing to agree shall submit their differences to the umpire. An award in writing of any two shall determine the amount of loss. The insured and the company shall each pay his chosen appraiser and shall bear equally the other expenses of the appraisal and umpire.

The company shall not be held to have waived any of its rights by any act relating to appraisal.

**11. Payment of Loss, Coverage C.**--The company may pay for the loss in money but there shall be no abandonment of the damaged property to the company.

**12. No Benefit to Bailee, Coverage C.**--The insurance afforded by this policy shall not inure directly or indirectly to the benefit of any carrier or bailee, other than the named insured, liable for loss to the property.

**13. Subrogation.**--In the event of any payment under this policy, the company shall be subrogated to all the insured's rights of recovery therefor against any person or organization and the insured shall execute and deliver instruments and papers and do whatever else is necessary to secure such rights. The insured shall do nothing after loss to prejudice such rights.

**14. Application of Insurance.**--The insurance afforded by this policy is primary insurance.

**15. Three Year Policy.**--A policy period of three years is comprised of three consecutive annual periods. Computation and adjustment of earned premium shall be made at the end of each annual period. Aggregate limits of liability as stated in this policy shall apply separately to each annual period.

**16. Changes.**--Notice to any agent or knowledge possessed by any agent or by any other person shall not effect a waiver or a change in any part of this policy or stop the company from asserting any right under the terms of this policy; nor shall the terms of this policy be waived or changed, except by endorsement issued to form a part of this policy.

**17. Assignment.**--Assignment of interest under this policy shall not bind the company until its consent is endorsed hereon.

**18. Cancellation.**--This policy may be canceled by the named insured by mailing to the company written notice stating when thereafter the cancellation shall be effective. This policy may be canceled by the company by mailing to the named insured, Contractor and governmental authority at the respective addresses shown in this policy written notice stating when not less than 30 days thereafter such cancellation shall be effective. The mailing of notice as aforesaid shall be sufficient proof of notice. The effective date and hour of cancellation stated in the notice shall become the end of the policy period.

Delivery of such written notice either by the named insured or by the company shall be equivalent to mailing.

If the named insured cancels, earned premium shall be computed in accordance with the customary short rate table and procedure. If the company cancels, earned premium shall be computed pro rata. Premium adjustment may be made either at the time cancellation is effected or as soon as practicable after cancellation becomes effective, but payment or tender of unearned premium is not a condition of cancellation.

**19. Declaration.**--By acceptance of this policy the named insured agrees that such statements in the declarations as are made by him are his agreements and representations, that this policy is issued in reliance upon the truth of such representations and that this policy embodies all agreements existing between himself and the company or any of its agents relating to this insurance.

In witness whereof, the \_\_\_\_\_ Insurance Company has caused this policy to be signed by its president and a secretary at \_\_\_\_\_, and countersigned on the declaration page by a duly authorized agent of the company.

(Facsimile of Signature)

(Facsimile of Signature)

\_\_\_\_\_  
Secretary

\_\_\_\_\_  
President

CERTIFICATE OF INSURANCE  
**Exhibit "C"**

This is to certify to:

RAILROAD FILE NO.:

(1) Railroad Agreements Branch, MS #9  
Engineering Service Center  
California Department of Transportation  
State of California  
1801 30th Street, Sacramento, California 95816

(2) and to the following Railroad Company

that such insurance as is afforded by the policy or policies described below for bodily injury liability and property damage liability is in full force and effect as of the date of this certificate and covers the following contractor as a named insured with respect to liability for damages arising out of operations performed by or for the named insured in connection with the contract or work described below.

1. Named Insured and Address

This is to certify that policies of insurance listed below have been issued to the insured named above and are in force at this time. Notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies.

2. Description of Work

Contract No. \_\_\_\_\_

3. Coverage's	Policy Expiration Date	Limits of Liability Each Occurrence	Aggregate
Contractor's Bodily Injury Liability and Property Damage Liability			
Umbrella or Excess Liability			

All of the coverages include coverage for the completed operations hazard, and X, C and U exposures.

Name of Insurance Company by Coverage

Coverage's	Company	Policy Number
Bodily Injury Liability		
Property Damage Liability		
Umbrella or Excess Liability		

4. The policy or policies described above will not be amended, altered, modified or cancelled until thirty (30) days after written notice thereof has been given by registered mail to the (1) Railroad Agreements Branch, Engineering Service Center, Department of Transportation, and (2) the Railroad named as certificate holder in this certificate.

Certificate Date:

For \_\_\_\_\_  
(Insurance Company)

By \_\_\_\_\_  
(Authorized Agent or Representative)

State of California  
Department of Transportation

DH-0S-A104(8-10-99)

Contract No. «Dist»-«Contract\_No»

## SECTION 14. FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS

**GENERAL.**—The work herein proposed will be financed in whole or in part with Federal funds, and therefore all of the statutes, rules and regulations promulgated by the Federal Government and applicable to work financed in whole or in part with Federal funds will apply to such work. The "Required Contract Provisions, Federal-Aid Construction Contracts, "Form FHWA 1273, are included in this Section 14. Whenever in said required contract provisions references are made to "SHA contracting officer", "SHA resident engineer", or "authorized representative of the SHA", such references shall be construed to mean "Engineer" as defined in Section 1-1.18 of the Standard Specifications.

**PERFORMANCE OF PREVIOUS CONTRACT.**—In addition to the provisions in Section II, "Nondiscrimination," and Section VII, "Subletting or Assigning the Contract," of the required contract provisions, the Contractor shall comply with the following:

The bidder shall execute the CERTIFICATION WITH REGARD TO THE PERFORMANCE OF PREVIOUS CONTRACTS OR SUBCONTRACTS SUBJECT TO THE EQUAL OPPORTUNITY CLAUSE AND THE FILING OF REQUIRED REPORTS located in the proposal. No request for subletting or assigning any portion of the contract in excess of \$10,000 will be considered under the provisions of Section VII of the required contract provisions unless such request is accompanied by the CERTIFICATION referred to above, executed by the proposed subcontractor.

**NON-COLLUSION PROVISION.**—The provisions in this section are applicable to all contracts except contracts for Federal Aid Secondary projects.

Title 23, United States Code, Section 112, requires as a condition precedent to approval by the Federal Highway Administrator of the contract for this work that each bidder file a sworn statement executed by, or on behalf of, the person, firm, association, or corporation to whom such contract is to be awarded, certifying that such person, firm, association, or corporation has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the submitted bid. A form to make the non-collusion affidavit statement required by Section 112 as a certification under penalty of perjury rather than as a sworn statement as permitted by 28, USC, Sec. 1746, is included in the proposal.

**PARTICIPATION BY MINORITY BUSINESS ENTERPRISES IN SUBCONTRACTING.**—Part 23, Title 49, Code of Federal Regulations applies to this Federal-aid project. Pertinent sections of said Code are incorporated in part or in its entirety within other sections of these special provisions.

### Schedule B—Information for Determining Joint Venture Eligibility

(This form need not be filled in if all joint venture firms are minority owned.)

1. Name of joint venture \_\_\_\_\_
2. Address of joint venture \_\_\_\_\_
3. Phone number of joint venture \_\_\_\_\_
4. Identify the firms which comprise the joint venture. (The MBE partner must complete Schedule A.) \_\_\_\_\_  
\_\_\_\_\_
  - a. Describe the role of the MBE firm in the joint venture. \_\_\_\_\_
  - b. Describe very briefly the experience and business qualifications of each non-MBE joint venturer: \_\_\_\_\_  
\_\_\_\_\_
5. Nature of the joint venture's business \_\_\_\_\_  
\_\_\_\_\_
6. Provide a copy of the joint venture agreement.
7. What is the claimed percentage of MBE ownership? \_\_\_\_\_
8. Ownership of joint venture: (This need not be filled in if described in the joint venture agreement, provided by question 6.).
  - a. Profit and loss sharing.
  - b. Capital contributions, including equipment.
  - c. Other applicable ownership interests.

9. Control of and participation in this contract. Identify by name, race, sex, and "firm" those individuals (and their titles) who are responsible for day-to-day management and policy decision making, including, but not limited to, those with prime responsibility for:

- a. Financial decisions \_\_\_\_\_  
b. Management decisions, such as:

- (1) Estimating \_\_\_\_\_  
(2). Marketing and sales \_\_\_\_\_  
(3). Hiring and firing of management personnel \_\_\_\_\_  
(4) Purchasing of major items or supplies \_\_\_\_\_

- c. Supervision of field operations \_\_\_\_\_

Note.—If, after filing this Schedule B and before the completion of the joint venture's work on the contract covered by this regulation, there is any significant change in the information submitted, the joint venture must inform the grantee, either directly or through the prime contractor if the joint venture is a subcontractor.

#### **Affidavit**

"The undersigned swear that the foregoing statements are correct and include all material information necessary to identify and explain the terms and operation of our joint venture and the intended participation by each joint venturer in the undertaking. Further, the undersigned covenant and agree to provide to grantee current, complete and accurate information regarding actual joint venture work and the payment therefor and any proposed changes in any of the joint venture arrangements and to permit the audit and examination of the books, records and files of the joint venture, or those of each joint venturer relevant to the joint venture, by authorized representatives of the grantee or the Federal funding agency. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under Federal or State laws concerning false statements."

_____ Name of Firm	_____ Name of Firm
_____ Signature	_____ Signature
_____ Name	_____ Name
_____ Title	_____ Title
_____ Date	_____ Date

Date \_\_\_\_\_

State of \_\_\_\_\_

County of \_\_\_\_\_

On this \_\_\_\_ day of \_\_\_\_\_, 19 \_\_, before me appeared (Name) \_\_\_\_\_, to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) \_\_\_\_\_ to execute the affidavit and did so as his or her free act and deed.

Notary Public \_\_\_\_\_

Commission expires \_\_\_\_\_

[Seal]

Date \_\_\_\_\_

State of \_\_\_\_\_

County of \_\_\_\_\_

On this \_\_\_\_ day of \_\_\_\_\_, 19 \_\_, before me appeared (Name) \_\_\_\_\_ to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) \_\_\_\_\_ to execute the affidavit and did so as his or her free act and deed.

Notary Public \_\_\_\_\_

Commission expires \_\_\_\_\_

[Seal]

**REQUIRED CONTRACT PROVISIONS  
FEDERAL-AID CONSTRUCTION CONTRACTS**

**I. GENERAL**

1. These contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.

3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.

4. A breach of the following clauses of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

Section I, paragraph 2;  
Section IV, paragraphs 1, 2, 3, 4, and 7;  
Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the DOL, or the contractor's employees or their representatives.

6. **Selection of Labor:** During the performance of this contract, the contractor shall not:

- a. discriminate against labor from any other State, possession, or territory of the United States (except for employment preference for Appalachian contracts, when applicable, as specified in Attachment A), or
- b. employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

**II. NONDISCRIMINATION**

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, and 41 CFR 60) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

- a. The contractor will work with the State highway agency (SHA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.
- b. The contractor will accept as his operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or

other forms of compensation; and selection for training, including apprenticeship, preapprenticeship, and/or on-the-job training."

2. **EEO Officer:** The contractor will designate and make known to the SHA contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO and who must be assigned adequate authority and responsibility to do so.

3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

- a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.
- b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.
- c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minority group employees.
- d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
- e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minority groups in the area from which the project work force would normally be derived.

- a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group applicants may be referred to the contractor for employment consideration.
- b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)
- c. The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group applicants will be discussed with employees.

5. **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

- a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.
- b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.



- c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.
- d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.

6. Training and Promotion:

- a. The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.
- b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.
- c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.
- d. The contractor will periodically review the training and promotion potential of minority group and women employees and will encourage eligible employees to apply for such training and promotion.

7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the contractor either directly or through a contractor's association acting as agent will include the procedures set forth below:

- a. The contractor will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.
- b. The contractor will use best efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.
- c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the SHA and shall set forth what efforts have been made to obtain such information.
- d. In the event the union is unable to provide the contractor with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The DOL has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the SHA.

8. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment.

- a. The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.
- b. Disadvantaged business enterprises (DBE), as defined in 49 CFR 23, shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of DBE construction firms from SHA personnel.
- c. The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.

9. **Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the SHA and the FHWA.

- a. The records kept by the contractor shall document the following:
  - (1) The number of minority and non-minority group members and women employed in each work classification on the project;
  - (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women;
  - (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and
  - (4) The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.
- b. The contractors will submit an annual report to the SHA each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.

### III. NONSEGREGATED FACILITIES

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

- a. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.
- b. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).
- c. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to award of subcontracts or consummation of material supply agreements of \$10,000 or more and that it will retain such certifications in its files.

#### IV. PAYMENT OF PREDETERMINED MINIMUM WAGE

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural minor collectors, which are exempt.)

##### 1. General:

- a. All mechanics and laborers employed or working upon the site of the work will be paid unconditionally and not less often than once a week and without subsequent deduction or rebate on any account [except such payroll deductions as are permitted by regulations (29 CFR 3)] issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c) the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also, for the purpose of this Section, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in paragraphs 4 and 5 of this Section IV.
- b. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.
- c. All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

##### 2. Classification:

- a. The SHA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.
- b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:
  - (1) the work to be performed by the additional classification requested is not performed by a classification in the wage determination;
  - (2) the additional classification is utilized in the area by the construction industry;
  - (3) the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and
  - (4) with respect to helpers, when such a classification prevails in the area in which the work is performed.
- c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the DOL, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

- d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. Said Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary
- e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

### **3. Payment of Fringe Benefits:**

- a. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof.
- b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as a part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

### **4. Apprentices and Trainees (Programs of the U.S. DOL) and Helpers:**

- a. Apprentices:
  - (1) Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.
  - (2) The allowable ratio of apprentices to journeyman-level employees on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate listed in the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor or subcontractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.
  - (3) Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator for the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.
  - (4) In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

b. Trainees:

- (1) Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the DOL, Employment and Training Administration.
- (2) The ratio of trainees to journeyman-level employees on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.
- (3) Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which case such trainees shall receive the same fringe benefits as apprentices.
- (4) In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Helpers:

Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV.2. Any worker listed on a payroll at a helper wage rate, who is not a helper under an approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

**5. Apprentices and Trainees (Programs of the U.S. DOT):**

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

**6. Withholding:**

The SHA shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same prime contractor, as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the SHA contracting officer may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

**7. Overtime Requirements:**

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which

he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

#### **8. Violation:**

Liability for Unpaid Wages; Liquidated Damages: In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible thereof shall be liable to the affected employee for his/her unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of \$10 for each calendar day on which such employee was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

#### **9. Withholding for Unpaid Wages and Liquidated Damages:**

The SHA shall upon its own action or upon written request of any authorized representative of the DOL withhold, or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 8 above.

### **V. STATEMENTS AND PAYROLLS**

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

#### **1. Compliance with Copeland Regulations (29 CFR 3):**

The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

#### **2. Payrolls and Payroll Records:**

- a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.
- b. The payroll records shall contain the name, social security number, and address of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof the types described in Section 1(b)(2)(B) of the Davis Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. In addition, for Appalachian contracts, the payroll records shall contain a notation indicating whether the employee does, or does not, normally reside in the labor area as defined in Attachment A, paragraph 1. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis Bacon Act, the contractor and each subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees, and ratios and wage rates prescribed in the applicable programs.
- c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices, trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased

from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

- d. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
  - (1) that the payroll for the payroll period contains the information required to be maintained under paragraph 2b of this Section V and that such information is correct and complete;
  - (2) that such laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR 3;
  - (3) that each laborer or mechanic has been paid not less than the applicable wage rate and fringe benefits or cash equivalent for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- e. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 2d of this Section V.
- f. The falsification of any of the above certifications may subject the contractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 231.
- g. The contractor or subcontractor shall make the records required under paragraph 2b of this Section V available for inspection, copying, or transcription by authorized representatives of the SHA, the FHWA, or the DOL, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the SHA, the FHWA, the DOL, or all may, after written notice to the contractor, sponsor, applicant, or owner, take such actions as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

## **VI. RECORD OF MATERIALS, SUPPLIES, AND LABOR**

- 1. On all Federal-aid contracts on the National Highway System, except those which provide solely for the installation of protective devices at railroad grade crossings, those which are constructed on a force account or direct labor basis, highway beautification contracts, and contracts for which the total final construction cost for roadway and bridge is less than \$1,000,000 (23 CFR 635) the contractor shall:
  - a. Become familiar with the list of specific materials and supplies contained in Form FHWA-47, "Statement of Materials and Labor Used by Contractor of Highway Construction Involving Federal Funds," prior to the commencement of work under this contract.
  - b. Maintain a record of the total cost of all materials and supplies purchased for and incorporated in the work, and also of the quantities of those specific materials and supplies listed on Form FHWA-47, and in the units shown on Form FHWA-47.
  - c. Furnish, upon the completion of the contract, to the SHA resident engineer on Form FHWA-47 together with the data required in paragraph 1b relative to materials and supplies, a final labor summary of all contract work indicating the total hours worked and the total amount earned.
- 2. At the prime contractor's option, either a single report covering all contract work or separate reports for the contractor and for each subcontract shall be submitted.

## **VII. SUBLETTING OR ASSIGNING THE CONTRACT**

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the State. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635).
  - a. "Its own organization" shall be construed to include only workers employed and paid directly by the prime contractor and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor, assignee, or agent of the prime contractor.
  - b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the contract as a whole and in general are to be limited to minor components of the overall contract.
2. The contract amount upon which the requirements set forth in paragraph 1 of Section VII is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.
3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the SHA contracting officer determines is necessary to assure the performance of the contract.
4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the SHA contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the SHA has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

## **VIII. SAFETY: ACCIDENT PREVENTION**

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the SHA contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.
2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).
3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

## **IX. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS**

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, the



following notice shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

**Notice To All Personnel Engaged On Federal-Aid Highway Projects**

18 U.S.C. 1020 READS AS FOLLOWS:

"Whoever being an officer, agent, or employee of the United States, or any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined not more than \$10,000 or imprisoned not more than 5 years or both."

**X. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT**

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$100,000 or more.)

By submission of this bid or the execution of this contract, or subcontract, as appropriate, the bidder, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.
2. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.
3. That the firm shall promptly notify the SHA of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.
4. That the firm agrees to include or cause to be included the requirements of paragraph 1 through 4 of this Section X in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

**XI. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION**

1. Instructions for Certification - Primary Covered Transactions:

(Applicable to all Federal-aid contracts - 49 CFR 29)

- a. By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection

Contract No. «Dist»-«Contract\_No»

with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

- c. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.
- d. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- e. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations.
- f. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.
- g. The prospective primary participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
- h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the "Lists of Parties Excluded From Federal Procurement or Nonprocurement Programs" (Nonprocurement List) which is compiled by the General Services Administration.
- i. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- j. Except for transactions authorized under paragraph f of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

#### **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Primary Covered Transactions**

1. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
  - a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
  - b. Have not within a 3-year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

- c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 1b of this certification; and
  - d. Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
2. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

## **2. Instructions for Certification - Lower Tier Covered Transactions:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions of \$25,000 or more - 49 CFR 29)

- a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.
- b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
- c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.
- d. The terms "covered transaction," "debarred," "suspended," "ineligible," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.
- e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
- f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
- g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.
- h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

**Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Lower Tier Covered Transactions**

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

**XII. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING**

(Applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 - 49 CFR 20)

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:
  - a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
  - b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.
3. The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

## FEDERAL-AID FEMALE AND MINORITY GOALS

In accordance with Section II, "Nondiscrimination," of "Required Contract Provisions Federal-aid Construction Contracts" the following are the goals for female utilization:

Goal for Women (applies nationwide).....(percent)	6.9
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The following are goals for minority utilization:

### CALIFORNIA ECONOMIC AREA

		Goal (Percent)
<b>174</b>	<b>Redding, CA:</b>	
	Non-SMSA Counties	6.8
	CA Lassen; CA Modoc; CA Plumas; CA Shasta; CA Siskiyou; CA Tehama.	
<b>175</b>	<b>Eureka, CA</b>	
	Non-SMSA Counties	6.6
	CA Del Norte; CA Humboldt; CA Trinity.	
<b>176</b>	<b>San Francisco-Oakland-San Jose, CA:</b>	
	SMSA Counties:	
	7120 Salinas-Seaside-Monterey, CA	28.9
	CA Monterey.	
	7360 San Francisco-Oakland	25.6
	CA Alameda; CA Contra Costa; CA Marin; CA San Francisco; CA San Mateo.	
	7400 San Jose, CA	19.6
	CA Santa Clara.	
	7485 Santa Cruz, CA.	14.9
	CA Santa Cruz.	
	7500 Santa Rosa, CA	9.1
	CA Sonoma.	
	8720 Vallejo-Fairfield- Napa, CA	17.1
	CA Napa; CA Solano	
	Non-SMSA Counties	23.2
	CA Lake; CA Mendocino; CA San Benito	
<b>177</b>	<b>Sacramento, CA:</b>	
	SMSA Counties:	
	6920 Sacramento, CA	16.1
	CA Placer; CA Sacramento; CA Yolo.	
	Non-SMSA Counties	14.3
	CA Butte; CA Colusa; CA El Dorado; CA Glenn; CA Nevada; CA Sierra; CA Sutter; CA Yuba.	
<b>178</b>	<b>Stockton-Modesto, CA:</b>	
	SMSA Counties:	
	5170 Modesto, CA	12.3
	CA Stanislaus.	
	8120 Stockton, CA	24.3
	CA San Joaquin.	
	Non-SMSA Counties	19.8
	CA Alpine; CA Amador; CA Calaveras; CA Mariposa; CA Merced; CA Tuolumne.	

		<b>Goal (Percent)</b>
<b>179</b>	<b>Fresno-Bakersfield, CA</b>	
	SMSA Counties:	
	0680 Bakersfield, CA	19.1
	CA Kern.	
	2840 Fresno, CA	26.1
	CA Fresno.	
	Non-SMSA Counties	23.6
	CA Kings; CA Madera; CA Tulare.	
<b>180</b>	<b>Los Angeles, CA:</b>	
	SMSA Counties:	
	0360 Anaheim-Santa Ana-Garden Grove, CA	11.9
	CA Orange.	
	4480 Los Angeles-Long Beach, CA	28.3
	CA Los Angeles.	
	6000 Oxnard-Simi Valley-Ventura, CA	21.5
	CA Ventura.	
	6780 Riverside-San Bernardino-Ontario, CA.	19.0
	CA Riverside; CA San Bernardino.	
	7480 Santa Barbara-Santa Maria-Lompoc, CA	19.7
	CA Santa Barbara.	
	Non-SMSA Counties	24.6
	CA Inyo; CA Mono; CA San Luis Obispo.	
<b>181</b>	<b>San Diego, CA:</b>	
	SMSA Counties	
	7320 San Diego, CA.	16.9
	CA San Diego.	
	Non-SMSA Counties	18.2
	CA Imperial.	

In addition to the reporting requirements set forth elsewhere in this contract the Contractor and subcontractors holding subcontracts, not including material suppliers, of \$10,000 or more, shall submit for every month of July during which work is performed, employment data as contained under Form FHWA PR-1391 (Appendix C to 23 CFR, Part 230), and in accordance with the instructions included thereon.

## **FEDERAL REQUIREMENT TRAINING SPECIAL PROVISIONS**

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training to develop full journeymen in the types of trades or job classification involved.

The goal for the number of trainees or apprentices to be trained under the requirements of this special provision will be 22.

In the event the Contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees or apprentices are to be trained by the subcontractor, provided however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The Contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of trainees or apprentices in each occupation shall be in their first year of apprenticeship or training.

The number of trainees or apprentices shall be distributed among the work classifications on the basis of the Contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment. Prior to commencing work, the Contractor shall submit to the Department for approval the number of trainees or apprentices to be trained in each selected classification and training program to be used. Furthermore, the Contractor shall specify the starting time for training in each of the classifications. The Contractor will be credited for each trainee or apprentice employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees or apprentices as provided hereinafter.

Training and upgrading of minorities and women toward journeymen status is a primary objective of this Training Special Provision. Accordingly, the Contractor shall make every effort to enroll minority and women trainees or apprentices (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees or apprentices) to the extent such persons are available within a reasonable area of recruitment. The Contractor will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee or apprentice in any classification in which he has successfully completed a training course leading to journeyman status or in which he has been employed as a journeyman. The Contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used the Contractor's records should document the findings in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by both the Department and the Federal Highway Administration. The Department and the Federal Highway Administration will approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee or apprentice for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with the State of California, Department of Industrial Relations, Division of Apprenticeship Standards recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the division office. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as otherwise noted below, the Contractor will be reimbursed 80 cents per hour of training given an employee on this contract in accordance with an approved training program. As approved by the Engineer, reimbursement will be made for training of persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the Contractor where he does one or more of the following and the trainees or apprentices are concurrently employed on a Federal-aid project; contributes to the cost of the training, provides the instruction to the trainee or apprentice or pays the trainee's or apprentice's wages during the offsite training period.

No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee or apprentice as a journeyman, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of this Training Special Provision. It is normally expected that a trainee or apprentice will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program. It is not required that all trainees or apprentices be on board for the entire length of the contract. A Contractor will have fulfilled his responsibilities under this Training Special Provision if he has provided acceptable training to the number of trainees or apprentices specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Only trainees or apprentices registered in a program approved by the State of California's State Administrator of Apprenticeship may be employed on the project and said trainees or apprentices shall be paid the standard wage specified under the regulations of the craft or trade at which they are employed.

The Contractor shall furnish the trainee or apprentice a copy of the program he will follow in providing the training. The Contractor shall provide each trainee or apprentice with a certification showing the type and length of training satisfactorily completed.

The Contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.